

Outdoor Life
Gun
Data
Book

Outdoor
Life
Book

An Outdoor Life Book

Outdoor Life
Gun
Data
Book

F. Philip Rice

Outdoor Life

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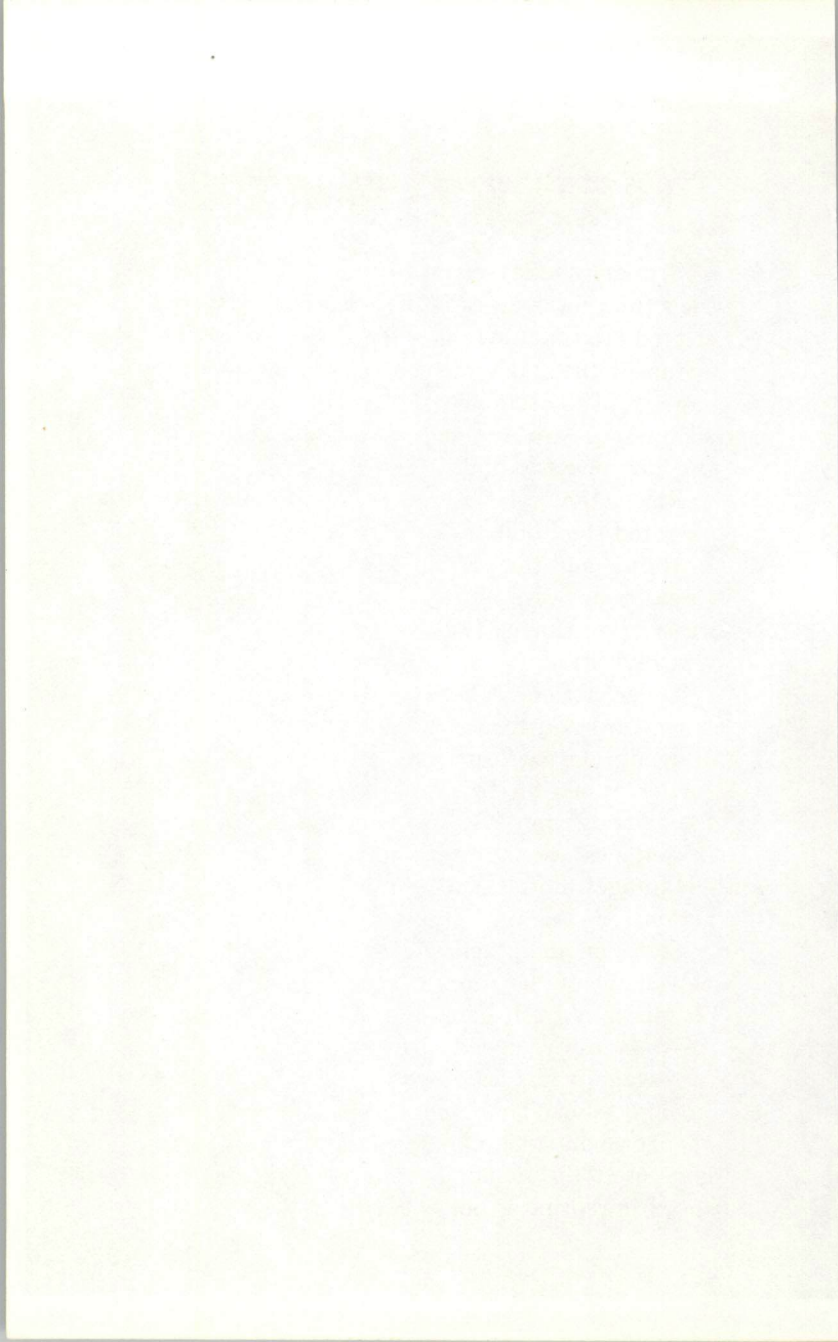
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PART ONE
Rifles
and
Ammunition



Types of Rifles

Semiautomatic, or autoloader. This rifle fires each time the trigger is pulled. The empty case is ejected and a new cartridge chambered by the action of the gun's recoil or spent gases. The advantage of the semiautomatic is firepower. The disadvantages are danger, below-average accuracy and proneness to malfunction.

Bolt action. This action depends on a manually operated steel bolt assembly to chamber and seal a cartridge, and then to eject the spent case. The advantages are ease of disassembly and cleaning, and superior accuracy. The disadvantage is slowness in repeated firing.

Lever Action. When the finger lever is moved downward and forward, the empty case is ejected, allowing another cartridge to be pushed onto the carrier. When the lever is returned, the bolt pushes the cartridge into the chamber ready for firing. The advantages are lightness, speed of operation. Disadvantages: not as accurate or as strong as the bolt action.

Slide, or pump action. A backward and forward movement of the forend ejects the spent case, rechambers a fresh cartridge, and recocks the rifle. Advantages are speed of reloading and firing; disadvantage is less accuracy.

Single-shot. This rifle comes in either a break-open or bolt action. It is most often a beginner's gun, used for plinking or target shooting, where speed in refiring is not needed.

U.S. Centerfire Rifles: Autoloading

| Model | Action | Caliber | Capacity |
|---------------------------------|-----------------------------------|-------------------------------------|----------------------|
| Armalite AR-180 Sporter Carbine | Semiauto, gas operated | .223 | 5-round magazine |
| Browning High-Powered Auto | Semiauto, gas operated | .243, .270, .30/06, .308 | 4-round magazine |
| Browning Magnum Auto | Semiauto, gas operated | 7mm Mag., .300 Win. Mag., .338 Mag. | 4-round magazine |
| Colt AR-15 Sporter | Semiauto, gas operated | .223 Rem. | 5-round magazine |
| H&R 360 Ultra-auto | Semiauto, gas operated | .243 Win. .308 Win. | 3-round magazine |
| M-1 Garand Auto | Semiauto, gas operated | .30/06 | 8-shot clip |
| M-1 Tanker Garand Auto | Semiauto, gas operated | .30/06 | 8-shot clip |
| National Ordnance M-1 Carbine | Gas operated, hammerless military | .30 carbine | 15-shot magazine |
| Plainfield Mach. Co. Carbine | Gas, semiauto | .30 carbine, .223 | 15-shot magazine |
| PJK M-60 Carbine | Blowback, semiauto | 9mm Luger | 30-shot magazine |
| Remington 742 Woodmaster Auto | Gas, semiauto | .243, 6mm, .280, .308, .30/06 | 4-shot clip magazine |

| Weight | Barrel | Length Overall | Sights | Features |
|--------|--------|-------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------|
| 6½ lbs | 18¼" | 38" | Flip-up, "L" type, and post front; scope available | Flash hider to prevent muzzle climb |
| 7⅜ lbs | 22" | 43½" | Adj. folding leaf rear, hooded ramp front with gold bead; tapped for scope | 5 grades |
| 8½ lbs | 24" | 45¼" | Same as high-powered | 5 grades |
| 6¼ lbs | 20" | 39" | Flip-up "L" type, post front | Flash suppressor |
| 7½ lbs | 22" | 43½" | Open adj. rear sight, gold bead front ramp; tapped for scope | Manually operated bolt stop, rollover cheekpiece for left or right hand |
| 9½ lbs | 24" | 43½" | Blade front, adj. peep rear | From Nat'l Ordnance |
| 8½ lbs | 17½" | Shortened version | Blade front, adj. peep rear | From Nat'l Ordnance |
| 5½ lbs | 18" | 35½" | Click adj. open rear, blade front; scope available | Also with folding stock |
| 6 lbs | 18" | 35½" | Click adj. open rear, gold bead front ramp | Also with telescoping wire stock |
| 7 lbs | 16⅜" | 27" | Blade front, aperture rear | Removable flash hider |
| 7½ lbs | 22" | 42" | Gold bead front on ramp, step rear; tapped for scope | Also available in custom deluxe and premier grade |

U.S. Centerfire Rifles: Autoloading (Cont.)

| Model | Action | Caliber | Capacity |
|--------------------------------------|------------------------------------|--------------|---------------------------------------------|
| Remington 742 Carbine | Gas, semiauto | .308, .30/06 | 4-shot clip magazine |
| Ruger Mini 14 .223 Carbine | Fixed piston, gas operated | .223 Rem. | 5-shot box magazine, 20-shot also available |
| Ruger .44 Auto-loading Carbine | Piston, gas operated | .44 Mag. | 4-shot tubular magazine |
| Ruger .44 Autoloading Deluxe Carbine | Piston, gas operated | .44 Mag. | 4-shot tubular magazine |
| Universal 1000 Auto-loading Carbine | Gas operated, hammerless, semiauto | .30-M1 | 5-shot magazine |
| Winchester 100 Autoloading | Gas, semiauto | .243, .308 | 4-shot box magazine |

U.S. Centerfire Rifles: Bolt Action

| Model | Caliber | Capacity | Weight |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------|
| American Fire-arms Stainless Rifle | .22/250, .243, 6mm Rem., 6mm Win. Mag., .25/06, .257 Win. Mag., .264 Win. Mag., 6.5 Rem. Mag., 6.5 x 55, .270, .270 Win. Mag., .284, 7 x 57, 7mm Rem. Mag., 7.62 x 39, .308, .30/06, .300 Win. Mag., .338 Win. Mag., .458 Mag. | Hinged floor-plate | 6½–11 lbs |

| Weight | Barrel | Length Overall | Sights | Features |
|--------|--------|----------------|---------------------------------------------------------|-----------------------------------------------------------------------------|
| 6¾ lbs | 18½" | 38½" | Same as 742 rifle | Shorter version |
| 6½ lbs | 18½" | 37¼" | Adj. rear, gold bead front | Sometimes available only to police |
| 5¾ lbs | 18½" | 36¾" | ⅛" front, folding leaf rear; tapped for scope | Bolt hold-open after last shot; mag. unloading button |
| 5¾ lbs | 18½" | 36¾" | Gold bead front, Ruger adj. peep rear, tapped for scope | Same as .44 Carbine |
| 5½ lbs | 18" | 35½" | Aperture rear, blade front; tapped for scope | Also comes in Model 1002 (military) and 1005 (Monte Carlo) with blue finish |
| 7¼ lbs | 22" | 42½" | bead front, folding-leaf rear | Sling swivels already installed |

| Barrel | Length Overall | Sights | Features |
|---------------------------------------|--------------------|------------------------|-------------------------------------------------------------------------|
| 16½", 18", 20", 22", 24", 26", or 28" | 44½" with 24" bbl. | None; tapped for scope | Model of stainless steel, blue, or satin finish; adj. trigger; 4 grades |

U.S. Centerfire Rifles: Bolt Action (Cont.)

| Model | Caliber | Capacity | Weight |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------------------------|
| Browning High-Power Rifle | .222, .222 Mag., .22/250, .243, .270, .284, .308, .30/06, 7mm Rem. Mag., .300 Win. Mag., .308 Norma, .338 Win. Mag., .375 H&H, .458 Win. Mag. | | 6½–8¼ lbs |
| Champlin Rifle | All std. calibers including .458 Win. Mag. and .460 Weath. Mag. | Hinged floor-plate | About 8 lbs |
| Colt Sauer Rifle | .25/06, .270, .30/06, 7mm Rem. Mag., .300 Win. Mag. | 3- or 4-shot magazine | 7½ lbs |
| Colt Sauer Grand African | .458 Win. Mag. | | 10½ lbs |
| 84 Pennsy Rifle, 84 Lobo Rifle, 84 Classic Rifle | All std. calibers from .17 Rem. to .460 | | Pennsy—7¾ lbs Lobo and Classic 7¼ lbs |
| H&R Model 322 Bolt Action | .222 Rem. | 6-shot magazine | 6¾ lbs |
| H&R 300 Ultra Bolt Action | .22/250, .243, .270, .308, .30/06, 7mm Rem. Mag., .300 Win. Mag. | Magnums are 3-shot; others, 5-shot | 7¾ lbs |
| H&R 301 Ultra Carbine | Same as 300 except no .22/250 | Same as 300 | 7¼ lbs |
| H&R 317 Ultra Wildcat | .17 Rem., .222, .223, or .17/223 (handload) | 6-shot magazine | 5¼ lbs |

| Barrel | Length Overall | Sights | Features |
|---------------------------------------|----------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 24" (for magnum) | 43" | Hooded front ramp, adj. folding leaf rear; none on .458; tapped for scope | Made in 3 grades; some models come without open sight |
| Up to 26"; choice of round or octagon | 45" | Ramp front with bead, 3-leaf folding rear | Right- or left-hand action, tang or shroud safety; adj. trigger |
| 24" | 43¾" | Scope mounts furnished | Nonrotating bolt with cam-actuated locking lug |
| 26" | 44½" | Ivory bead hooded ramp front, adj. sliding rear | |
| 24" | 44½" | None furnished | Pennsy has ultra-mod. stock design. Lobo, less radical design. Classic is std. design, 4 grades |
| 24" | | Tapped for scope | Adj. trigger, short throw bolt action |
| 22" | 42½" | Adj. rear, gold bead front ramp; tapped for scope | Recoil pad; Sako action |
| 18" | | Same | Mannlicher style stock |
| 20" | 38½" | None; tapped for scope | Adj. trigger |

U.S. Centerfire Rifles: Bolt Action (Cont.)

| Model | Caliber | Capacity | Weight |
|---------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------|----------|
| H&R 370 Ultra Medalist | .22/250, 6mm Rem., and .243 | 5-shot magazine | 9½ lbs |
| Ithaca LSA 55 Bolt Action Rifle | .222, .22/250, .243, .270, .308, 6mm Rtm., .30/06 | 3-shot magazine | 6½ lbs |
| Ithaca LSA 65 Bolt Action Rifle | .222, .25/06, .270, .30/06 | Same as LSA 55 except .30/06 has 4-shot clip | |
| Mossberg 810A Bolt Action Rifle | .270, .30/06, .338 | .338—3-shot, others are 4-shot | 7½—8 lbs |
| Mossberg 810B | 7mm Rem. Mag. | | |
| Mossberg 810C | .270 Win. | | |
| Mossberg 810D | .338 Win. Mag. | All same as 810A | |
| Mossberg 800 Bolt Action Rifle | .22/250, .243, .308 | 4-shot magazine; hinged floorplate | 6½ lbs |
| Mossberg 800 V/T | .22/250, .243 | | 9½ lbs |
| Omega III Bolt Action | .25/06, .270, .30/06, 7mm Rem. Mag., .300 Win. Mag., .338 Win. Mag., .358 Norma Mag. | Rotary magazine, 5 std. or 4 belted | 7¼ lbs |
| Pederson 3000 Bolt Action Rifle | .270, .30/06, 7mm Rem. Mag., .338 Win. Mag. | 3-shot magazine | 7 lbs |

| Barrel | Length Overall | Sights | Features |
|-------------------------------------------------|---------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| 24" Varmint, target wt. | 44¾" | None; tapped for open or scope sight | Adj. trigger; Sako action |
| 23" | 41½" | Removable rear adj., ramp front; tapped for scope | Adj. trigger, top tang safety; also in deluxe model |
| Same as LSA 55 | | | |
| 22" | 42" | Gold bead ramp front, folding-leaf rear; tapped for scope or sight | Top tang safety, detachable box magazine |
| | 33" | | Same as 810A |
| | | | Same as 810A |
| All same as 810A | | | |
| 22" | 42" | Gold bead ramp front, adj. folding- leaf rear; tapped for scope | Top tang safety; also comes in de- luxe (800D) or with scope (800SM) |
| 24" | 44" | Target scope base | |
| 22" or 24" | 42" | None | Right- or left-hand action; dual safety, adj. trigger |
| 22" (.270 and .30/06); other calibers 24" | 42" | Tapped for scope; iron sight model available | Adj. trigger, 3 grades available |

U.S. Centerfire Rifles: Bolt Action (Cont.)

| Model | Caliber | Capacity | Weight |
|-----------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------|----------|
| Ranger Arms Bolt Action Rifle | All std. from .22/250 to .458 Win. Mag. | | Varies |
| Remington 700 ADL Bolt Action | .222, .22/250, 6mm Rem., .243, .25/06, 7mm Rem. Mag., .308, .30/06 | | 7 lbs |
| Remington 700 BDL | Same as 700 ADL, plus 6.5 Rem. Mag., .264 and .300 Win. Mag., .17 Rem. | Quick release floorplate | 7½ lbs |
| Remington 700 Safari | .375 H&H or .458 Win. Mag. | | |
| Remington 700 BDL. Left Hand | .270 and .30/06 | | |
| Remington 700 BDL Varmint | .222, .223, .22/250, 6mm Rem., .243, .25/06 | | 9 lbs |
| Remington 700C Custom Rifle or M700C Custom Mag. | | With or with- out hinged floorplate | |
| Remington 788 Bolt Action | .222, .22/250, 6mm Rem., .243 and .308 | 4 shot except .222 (5 shot); detachable box magazine | 7-7½ lbs |
| Remington 788 Left Hand Bolt Action | 6mm and .308 only | | |

| Barrel | Length Overall | Sights | Features |
|--------------------------------|---------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------|
| As desired up to 25½" | Varies | None furnished; tapped for scope | Push-button safety, adj. trigger, right- or left-hand models |
| 22" or 24" | 41½" to 43½" | Gold bead ramp front, removable step-adj. rear; tapped for scope | Side safety |
| | 44½" | Hooded ramp front sight, removable step-adj. rear; tapped for scope | Checkering comes in 3 grades |
| | | | Same as 700 BDL; hand checkered, recoil pad |
| | | | Same as 700 BDL |
| 24" heavy | 43½" | None furnished | Same as 700 BDL |
| Choice of 20", 22", or 24" | | With or without sights (choice) | Recoil pad, oil finish, left-hand cheekpiece extra |
| 22", 24" (.222 and .22/250) | 41½" | Blade ramp front, open rear adj.; tapped for scope | Thumb safety available with scope (optional) |
| | | | Same as 788 ex- cept left hand stock and action |

U.S. Centerfire Rifles: Bolt Action (*Cont.*)

| Model | Caliber | Capacity | Weight |
|----------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------|
| Ruger 77 Bolt Action | .22/250, .250/.3000, .243, 6mm, .308, 6.5mm Mag., .284, .350 Mag. | 6.5mm maga- zine, .284, .350 magazine (3 shot); others 5 shot; hinged floorplate | 6¾ lbs |
| Ruger 77 Magnum Rifle | .25/06, .270, .30/06, 7mm Rem. Mag., .300 Win. Mag., .338 Win. Mag., .458 Win. Mag. | .25/06, .270, .30/06 5 shot; others 3 shot | Varies |
| Ruger 77 Magnum Round Top | Same as 77 Magnum except no .458 Win. Mag. | | |
| Ruger 77 Varmint | .22/250, .243, 6mm, .25/06 | | 9 lbs |
| Savage 110E Bolt Action Rifle | .30/06, 7mm Rem. Mag. | .30/06, 4 shot; 7mm Rem. Mag., 3 shot | 6¾ lbs (.30/06) 7¾ lbs (7mm) |
| Savage 110C Bolt Action Rifle | .243, .25/06, .270, .30/06, 7mm Rem. or .300 Win. Mag. | 7mm Rem. and .300 Win. Mag., 3 shot; others 4 shot | |
| Savage 110D Bolt Action Rifle | .243, .270, .30/06, 7mm Rem. or .300 Win. Mag. | | 6¾–8 lbs |

| Barrel | Length Overall | Sights | Features |
|----------------------------------|-------------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 22" | 42" | Optional gold bead front ramp, folding-leaf adj. rear, or scope rings or both | Adj. trigger, tang safety; scope optional |
| .270 and .30/06, 22"; others 24" | Varies | Same as model 77. Rings, sights, or both | |
| | | Round-top receiver tapped for scope; open sights std. equip. | |
| 24" heavy | 44" | Barrel tapped for target scope; scope mt. base in receiver | Adj. trigger; barreled actions avail. |
| 20" (.30/06), 24" (7mm) | 40½" or 44½" | Gold bead ramp front, step-adj. rear; tapped for peep or scope | Rt. and lft. hand model, top tang safety; Model 110ES comes with scope |
| | | | Same as 110D, except detachable box magazine, rt. or lft. hand |
| 22" bbl., 24" on magazine | | Folding-leaf rear sight, gold bead, ramp front | Rt. or lft. hand; same as 110E except stock and as noted |

U.S. Centerfire Rifles: Bolt Action (Cont.)

| Model | Caliber | Capacity | Weight |
|--------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Savage 340 Clip Repeater | .222, .30/30 | .222 Rem., 4 shot; .30/30, 3 shot, detach- able clip magazine | 6½ lbs |
| Smith & Wesson Model 125 | .270 or .30/06 | 5 shot | 7½ lbs |
| Springfield Model L903-A3 | .30/06 | 5-shot maga- zine, hinged floorplate | 8½ lbs |
| Weatherby Mark V Bolt Action Rifle | All Weatherby calibers plus .22/250 and .30/06 | .240, 6 shot; .224, .30/06, 5 shot; .22/250, .257, .270, 7mm, .300, .340, 4 shot; .378, .460, 3 shot; hinged floorplate | .224, .22/ 250, 6½ lbs; .340, 378, 8½ lbs; .460, 10½ lbs; others, 7¼ lbs |
| Weatherby Vanguard Bolt Action Rifle | .25/06, .243, .270, .30/06, .308, 7mm Rem., and .300 Win. Mag. | 7mm Rem. and .300 Win., 3 shot; others, 5 shot; hinged floorplate | 7⅞ lbs |
| Western Field 780 Bolt Action Rifle | .243, .308 | 5-shot maga- zine; hinged floorplate | 6½ lbs |
| Western Field 730 Bolt Action Rifle | .30/06 only | Removable magazine | 8½ lbs |
| Western Field 712 Bolt Action Rifle | .222, .30/30 | .222, 4 shot; .30/30, 3 shot | 6½ lbs |

| Barrel | Length Overall | Sights | Features |
|---------------------------|----------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 24" and 22" (.30/30) | 40"–42" | Gold bead ramp front, folding-leaf rear; tapped for scope | Sliding thumb safety |
| 24" | 44¾" | Hooded ramp front with gold bead, step rear adj.; tapped for scope | Thumb type safety; 2 grades; sights removed for scope |
| 24" | 43¼"–46½" | None; optional and extra | Adj. trigger, cocking indicator, thumb safety |
| 24" or 26" | 43¼"–46½" | Optional and extra | Adj. trig., cocking indicator, thumb safety, Deluxe & Custom grades; lft. hd. available |
| 24" | 44½" | Iron or scope; extra cost; tapped for scope | Adj. trig., side safety |
| 22" | 43" | Ramp, gold bead front, rear adj. for e; tapped for scope | Top tang safety, recessed bolt head |
| 22" | | Bead ramp front, folding rear | Top receiver safety, lt. wt. sporter |
| 22", .30/30; 24", .222 | 40" (22" bbl.) | Ramp front, rear adj. for e; tapped for scope | Side safety |

U.S. Centerfire Rifles: Bolt Action (Cont.)

| Model | Caliber | Capacity | Weight |
|-------------------------------------|------------------------------------------------------------------------------------|-----------------------------|----------------------------------|
| Winchester 70 Std. Rifle | .222, .22/250, .25/06, .243, .270, .308, .30/06 | 5-shot hinged floorplate | 7½ lbs |
| Winchester 70 Super Grade | .243, .270, .30/06, .300 Win. Mag. | | |
| Winchester 70 Magnum Rifle | 7 Rem., .264, .300, .338 Win., .375 H&H (all calibers are magnum) | 3 round | 7¾ lbs, 8½ lbs in .375 H&H |
| Winchester 70 Varmint Rifle | .222, .22/250, .243 only | | 9¾ lbs |
| Winchester 70 African | .458 Win. Mag. only | 3 shot | 8½ lbs |
| Winchester 70A Bolt Action Rifle | .222, .22/250, .243, .25/06, .270, .30/06, .308 | | 7½-7½ lbs |
| Winchester 70A Mag. | .264, 7mm Rem., .300 Win. | 3 round | 7¼ lbs |
| Winchester 670 Bolt Action Rifle | .243, .30/06 | 4 shot | 7 lbs (.30/06) |
| Winslow Bolt Action Rifle | All std. cartridges in- cluding Mag. varmint caliber = .17/222 or .17/223 | 4-shot magazine | 7-7½ lbs |

| Barrel | Length Overall | Sights | Features |
|------------------|-----------------|---------------------------------------------------------------------|-----------------------------------------------------|
| 22" | 42½" | Removable hooded bead ramp front, adj. open rear; tapped for scope | |
| | | | Same as 70 std. caliber and fancy work |
| 24" | 44½" | | Same as 70 std. except as noted; recoil pad |
| 24" heavy | 44½" | Target scope blocks, no iron sights | Same as 70 std. except as noted |
| 22" heavy | | Special rear sight | Recoil pad, same as std. except as noted |
| 22", .25/06, 24" | 42½" (22" bbl.) | Removable hooded ramp front, adj. open rear | 3-position safety, checkering |
| 24" | 44" | | Same as 70A except as noted; recoil pad |
| 22" | 42½" | Ramp front sight and adj. open rear (both detachable for scope use) | 2-position safety, red cocking indicator |
| 24", 26", Mag. | 43" | None; metallics available at extra cost; tapped for scope | Recoil pad, 6 grades avail.; lft. hd. models avail. |

U.S. Centerfire Rifles: Lever Action

| Model | Caliber | Capacity | Weight |
|-------------------------------------------|----------------------------------------------------------------------|----------------------------------------|--------------|
| Browning BLR Lever-Action Rifle | .243 or .308 Win. | 4-shot detachable magazine | 6 lbs, 15 oz |
| Marlin 336C Lever-Action Carbine | .30/30, .35 Rem. | 6-shot tubular magazine | 7 lbs |
| Marlin Glenfield 30A Lever-Action Carbine | .30/30 only | Same as 336C except checkered stock | |
| Marlin 336T | .30/30 only | Same as 336C except straight stock | |
| Marlin 336 Octagon | .30/30 only | Same as 336T except 22" Octagon barrel | |
| Marlin 336A | Same as 336 except 24" round barrel and 5-shot capacity | | |
| Marlin 444 Lever-Action Sporter | .444 Marlin | 4-shot tubular magazine | 7½ lbs |
| Marlin 1894 Octagon Lever-Action Carbine | .44 Magnum | 10-shot magazine | 6 lbs |
| Marlin 1894 Sporter | Same as 1894 except 22" barrel, 6-shot magazine, overall length 39½" | | |
| Marlin Zane Grey Century | .30/30 | 6-shot tubular magazine | 7 lbs |

| Barrel | Length Overall | Sights | Features |
|----------------------------------------------------------------------|----------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 20" | 39¾" | Square notch adj. rear, gold bead on hooded ramp front; tapped for scope | Half-cock hammer safety, recoil pad |
| 20" microgroove | 38½" | Wide-scan ramp front, semibuckhorn adj. rear; tapped for scope | Offset hammer spur; 336T same as 336C except straight stock & .30/30 only |
| Same as 336C except checkered stock | | | |
| Same as 336C except straight stock | | | Squared finger lever |
| Same as 336T except 22" Octagon barrel | | Bead front sight | |
| Same as 336 except 24" round barrel and 5-shot capacity | | | |
| 22" microgroove | 40½" | Bead front, folding leaf adj. rear; tapped for scope | Offset hammer spur |
| 20" microgroove | 37½" | Bead ramp front, semibuckhorn adj. rear; tapped for scope | Offset hammer spur |
| Same as 1894 except 22" barrel, 6-shot magazine, overall length 39½" | | | |
| 22" octagon | 40½" | Bead front, adj. semibuckhorn rear; tapped for scope | Offset hammer |

U.S. Centerfire Rifles: Lever Action (Cont.)

| Model | Caliber | Capacity | Weight |
|---------------------------------------|------------------------------|---------------------------------------------------|--------|
| Marlin 1895 Lever-Action Rifle | .45/70 | 4-shot tubular magazine | 7 lbs |
| Mossberg 472 Lever-Action | .30/30 | 6-shot magazine | 7½ lbs |
| Savage 99E Lever-Action Rifle | .300 Savage, .243, .308 Win. | 5-shot rotary magazine | 7 lbs |
| Savage 99A Lever-Action Rifle | Same as 99E plus .250/3000 | Same as 99E except as noted | |
| Savage 99F Light-weight Carbine | Same as 99E | | 6½ lbs |
| Savage 99C Lever-Action Clip Rifle | .243, .284, .308 | Staggered clip magazine with push-button ejection | 6¾ lbs |
| Savage 99DL Carbine | .243, .308 | Same as 99F except as noted | 6¾ lbs |
| Western Field 72 Lever-Action Carbine | .30/30 | 6-shot magazine | 7½ lbs |
| Western Field Commemorative 72 | .30/30 | 6-shot magazine | 7½ lbs |

| Barrel | Length Overall | Sights | Features |
|--------------------------------|-------------------|------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 22" round | 40½" | Bead front, adj. semibuckhorn rear; tapped for scope | Offset hammer spur |
| 20" | 38½" | Ramp front, adj. rear | Hammer-block safety, solid top receiver with side ejector |
| 20" chromemoly steel | 39¾" | Ramp front with step adj. rear; tapped for scope | Slide safety locks trigger and lever |
| Same as 99E except as noted | | Folding leaf rear sight | Tang top safety; straight grip walnut stock |
| 22" Lightweight | 41¾" | | Magazine indi- cator |
| Same as 99F except as noted | | | |
| Same as 99F except as noted | | 41¾" | High comb, Monte Carlo stock |
| 20" | 38½" | Ramp front, rear adj. | Hammer-block safety; solid top re- ceiver with side ejection |
| 20" round | 38½" | Ramp front, rear adj. | Same as std. 72, but with select checkered stock, gold-filled deer scenes, medallion |

U.S. Centerfire Rifles: Lever Action (Cont.)

| Model | Caliber | Capacity | Weight |
|------------------------------------------|---------------------|----------------------------|--------|
| Winchester 94 Texas Ranger Commemorative | .30/30 | 7 shot | 7 lbs |
| Winchester 98 Lever-Action Rifle | .243, .308 | 4-shot detachable magazine | 7¼ lbs |
| Winchester 94 Lever-Action Carbine | .30/30, .32 Special | 6-shot tubular magazine | 6½ lbs |
| Winchester 94 Antique Carbine | .30/30 only | Same as 94 except fancy | |
| Winchester 64 Lever-Action Rifle | .30/30 | | 6⅝ lbs |

U.S. Centerfire Rifles: Slide Action

| Model | Caliber | Capacity | Weight |
|---------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------|--------|
| Remington 760 Gamemaster Slide Action | .243, .270, .308 Win., .30/06, 6mm Rem. | 4-shot detachable clip | 7½ lbs |
| Remington 760 BDL Gamemaster | .270, .308, .30/06 | Same as 760 except stepped receiver, Monte Carlo stock, checkering, fancy work | |

| Barrel | Length Overall | Sights | Features |
|-----------|-------------------|-----------------------------------------------------------------------|---------------------------------------------|
| 20" round | 37¾" | Curved post front, semibuckhorn rear | Patterned after 1894 rifle; limited edition |
| 22" round | 42½" | Bead front sight on ramp, with cover, folding-leaf rear | Hammerless side ejection, cross-bolt safety |
| 20" | 37¾" | Bead front on ramp, with removable cover; open rear; tapped for scope | Top ejection, half-cock hammer safety |

Same as 94 except fancy

| | | | |
|-----|-----|---------------------------------------------------------|----------------------------------------------------------------|
| 24" | 42" | Hooded ramp and bead-post front, adj. semibuckhorn rear | Top ejection, half-cock hammer, side scope mount accommodation |
|-----|-----|---------------------------------------------------------|----------------------------------------------------------------|

| Barrel | Length Overall | Sights | Features |
|--------|-------------------|-------------------------------------------------------------------------|-------------------|
| 22" | 42" | Gold bead front on ramp, open step adj. sporting rear; tapped for scope | Cross-belt safety |

Same as 760 except stepped receiver, Monte Carlo stock, checkering, fancy work

Also in Peerless (D) and Premium (F) grades and with gold inlay (F)

U.S. Centerfire Rifles: Slide Action (Cont.)

| Model | Caliber | Capacity | Weight |
|-------------------------------------|-----------------|--------------------|--------|
| Remington 760 Gamemaster Carbine | .308 and .30/06 | | 7¼ lbs |
| Savage 170 Slide Action | .30/30 only | 3-shot magazine | 6¾ lbs |

U.S. Centerfire Rifles: Single Shot

| Model | Caliber | Weight | Barrel |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------------|
| Browning '78 Single Shot | .22/250, 6mm Rem., .25/06, .30/06 | 7¾ lbs octagon | 26" octagon or round |
| Clerk Single- Shot Hi-Wall Rifle | .222, .223, .22/250, .243, 6mm Rem., .250 Sav., .257 Roberts, .25/06, .264, .270, 7mm Rem. Mag., .30/30, .30/06, .300 Win., .375 H&H, .458 Win., .45/70 | | 26" |
| H&R Calvary Model Carbine | .45/70 | 7 lbs | 22" |
| H&R Officers Model 1873 | .45/70 | 8 lbs. | 26" round |
| H&R LBH Commemorative Carbine | .45/70 | 7¼ lbs | 22" |

| Barrel | Length Overall | Sights | Features |
|-------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------|
| 18½" | 38½" | | Same as 760 except as noted |
| 22" | 41½" | Gold bead front ramp, folding-leaf rear; tapped for scope | Hammerless, top- tang safety |
| | | | |
| Length Overall | Sights | Features | |
| 42" | None; scope mount and rings furnished | Falling block action, exposed trigger, half-cock safety | |
| | None; tapped for scope | Exposed hammer; deluxe model same except adj. trigger, half-octagon bbl., checkered stock | |
| 41" | Blade front, adj. leaf rear | Replica of 1871 Springfield Carbine; also avail. in deluxe and silver plated | |
| 44" | Blade front, vernier tang adj. rear | Replica of 1873 Springfield | |
| 41" | Blade front, tang mounted aperture adj. rear | Replica of 1871 Springfield Carbine, Little Big Horn Com- memorative | |

U.S. Centerfire Rifles: Single Shot (Cont.)

| Model | Caliber | Weight | Barrel |
|------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------|
| H&R 158 Topper Rifle | .30/30 | 5¼ lbs | 22" round |
| Hyper-Single Rifle | All calibers, standard and wildcat | Customer specifications | Choice of maker, weight, length |
| Ruger Number One Single Shot | .22/250, .243, 6mm Rem., .25/06, .270, .30/06, 7mm Rem. Mag., .300 Win., .45/70, .458 Win Mag., .375 H&H Mag. | 8 lbs | 26" |
| Ruger Number 3 Carbine Single Shot | .22 Hornet, .30/40 Krag, .45/70 | 6 lbs | 22" round |

U.S. Rimfire Rifles: Autoloading

| Model | Action | Caliber | Capacity | Weight |
|-----------------------------------|--------------------------------------------------|---------|--------------------------|--------|
| Armalite AR-7 Explorer Carbine | Semiauto | .22 LR | 8 shot | 2¾ lbs |
| Browning Auto-loading Rifle | Semiauto | .22 LR | 11-shot tubular magazine | 4¾ lbs |
| Colt Colteer Auto-loading Carbine | Semiauto | .22 LR | 15-shot tubular magazine | 4¾ lbs |
| Colt Courier | Same as Colteer except stock with tapered forend | | | |

| Length Overall | Sights | Features |
|------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| 37½" | Lyman folding adj. rear and ramp front | Side lever break-open action with visible hammer; converts to 20 ga. shotgun with other bbl. |
| Customer specifica- tions | None furnished; tapped for scope | Falling block action, adj. trig- ger, tang safety |
| 42" | None; 1" scope rings supplied | Hammerless, falling block de- sign, auto ejector, top tang safety; also avail. in 4 other models |
| 38½" | Gold bead front, adj. folding-leaf rear | Same as No. 1 except different lever; auto ejector, top tang safety, adj. trigger |

| Barrel | Length Overall | Sights | Features |
|---------------|---------------------------|-------------------------------------------------------------------------------------|---------------------------------|
| 16" | 34½", 16½" folded | | Take down design; will float |
| 19¼" | 37" | Gold bead front, leaf rear; grooved for tip- off scope mount | Cross-bolt safety; 3 grades |
| 13⅜" | 37" | Hooded gold bead front. Notched adj. rear. Grooved for tip-off scope mount | Cross-bolt safety |

Same as Colteer except stock with tapered forend

U.S. Rimfire Rifles: Autoloading (Cont.)

| Model | Action | Caliber | Capacity | Weight |
|--------------------------------------|--------------------------------------------------------------------------|-----------------------------------|-----------------------------------|--------|
| Colt Stagecoach | Same as Colteer except | | | |
| High Std. Sport-King Automatic Rifle | Semiauto | .22 LR, .22 L, .22 Hi-Speed Short | 15 LR, 17 L, 21S tubular magazine | 5½ lbs |
| Marlin 49DL Auto-loading Rifle | Semiauto | .22 LR | 18-shot tubular magazine | 5½ lbs |
| Marlin 99C Auto-loading Rifle | Same as 49DL except checkered stock | | | |
| Marlin 99 M1 Autoloading Carbine | Semiauto | .22 LR | 9-shot tubular magazine | 4½ lbs |
| Marlin 989 M2 Autoloading Carbine | Same as 99 M1 except 7-shot detachable clip magazine | | | |
| Marlin Glenfield 60 Autoloader | Semiauto | .22 LR | 18-shot tubular magazine | 5½ lbs |
| Mossberg 353 Rifle | Semiauto | .22 LR | 7-shot clip | 5 lbs |
| Remington 552A Autoloading Rifle | Semiauto | .22 LR, .22 L, .22 Hi-Speed Short | 15 LR, 17L, 20 S | 5¾ lbs |
| Remington 552BDL Auto Rifle | Same as 552A except checkered, and blade ramp front and adj. rear sights | | | |
| Remington 552C Autoloading Carbine | Same as 552A except 21" bbl., 5½ lb. weight, and 40" overall | | | |

| Barrel | Length Overall | Sights | Features |
|--------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------|
| 16½" | 33¾" | | |
| 22¼" | 42¾" | Post front, stepped blade rear, grooved for scope | Thumb actuated safety on right |
| 22" micro-groove | 40½" | Blade ramp front, step rear adj.; grooved for tip-off scope | Bolt hold open for safety and cleaning; comes also in Deluxe Model |
| Same as 49DL except checkered stock | | | |
| 18" micro-groove | 37" | Blade on band type ramp front, flat top adj. mid sight; grooved for tip-off scope | Bolt hold open |
| Same as 99 M1 except 7-shot detachable clip magazine | | | |
| 22" | 41" | Blade ramp front, step adj. rear | Grooved for tip-off scope mount |
| 18" | 38" | Open step adj. U-notch rear, bead front on ramp; grooved for scope | Extension forend folds down for steady firing in prone position |
| 23" | 42" | Bead front, step adj. rear; grooved for tip-off scope | Cross-bolt safety |
| Same as 552A except checkered, and blade ramp front and adj. rear sights | | | |
| Same as 552A except 21" bbl., 5½ lb. weight, and 40" overall | | | |

U.S. Rimfire Rifles: Autoloading (Cont.)

| Model | Action | Caliber | Capacity | Weight |
|----------------------------------------------|---------------------------------------------------------------------|---------|------------------------------------|--------|
| Remington Nylon 66MB Auto Rifle | Semiauto | .22 LR | 14-shot tubular magazine | 4 lbs |
| Remington Nylon 66AB Auto Rifle | Same as 66MB except Apach Black Nylon Stock, chrome-plated receiver | | | |
| Remington Mohawk 10C Auto Rifle | Same as Nylon 66 except removable 10-shot 22 LR clip magazine | | | |
| Ruger 10/22 Auto-loading Carbine | Semiauto | .22 LR | 10-shot detachable rotary magazine | 5 lbs |
| Ruger 10/22 Auto Sporter | Same as 10/22 carbine except checkered, no barrel bands | | | |
| Savage & Stevens 88 Autoloading Rifle | Semiauto | .22 LR | 15-shot tubular magazine | 6 lbs |
| Weatherby Mark XII Auto Rifle, Clip Model | Semiauto | .22 LR | 5- or 10-shot clip | 6 lbs |
| Weatherby Mark XII Auto Rifle, Tubular Model | Same as XII Clip Model except 15-shot tubular magazine | | | |
| Western Field 868 Auto Rifle | Semiauto | .22 LR | 15-shot tubular magazine | 6½ lbs |
| Western Field 894 Auto Rifle | Semiauto | .22 LR | 15-shot tubular magazine | 6¼ lbs |

| Barrel | Length Overall | Sights | Features |
|------------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------|
| 19 $\frac{5}{8}$ " | 38 $\frac{1}{2}$ " | Blade ramp front, adj. open rear; grooved for tip-off scope | Top tang safety; Mohawk brown color |
| Same as 66MB except Apach Black Nylon Stock, chrome-plated receiver | | | |
| Same as Nylon 66 except removable 10-shot 22 LR clip magazine | | | |
| 18 $\frac{1}{2}$ " | 37" | Gold bead front, adj. folding-leaf rear; tapped for scope | Cross-bolt safety |
| Same as 10/22 carbine except checkered, no barrel bands | | | |
| 20" | 40 $\frac{1}{2}$ " | Blade front, step-adj. open rear; grooved for tip-off scope | Top tang safety |
| 24" | 42 $\frac{1}{4}$ " | Gold bead front ramp, 3-leaf folding rear; grooved for tip-off scope | Thumb operated side safety; also acts as single shot selector |
| Same as XII Clip Model except 15-shot tubular magazine | | | |
| 20" | 39 $\frac{1}{2}$ " | Ramp front, adj. rear | Plastic buttplate |
| 20" | 39" | Bead front ramp, folding-leaf rear | Topside safety auto, bolt hold open after last shot |

U.S. Rimfire Rifles: Autoloading (Cont.)

| Model | Action | Caliber | Capacity | Weight |
|-------------------------------------|-------------------------------------------------------------------------|--------------------|-----------------------------------------------|--------|
| Winchester 290 Autoloading Rifle | Semiauto | .22 L or .22 LR | .22 L—17, .22 LR—15 tubular magazine | 5 lbs |
| Winchester 190 Auto Rifle | Same as 290 except no checkering, no pistol grip or buttplate spacer | | | |

U.S. Rimfire Rifles: Bolt Action

| Model | Caliber | Capacity | Weight | Barrel |
|---------------------------------------------|-----------------------------------------------------------------------------------------|-------------------------|--------|--------------------|
| Browning T-Bolt, T-2 Repeating Rifle | .22 LR | 5-shot clip | 6 lbs | 24" |
| H&R 865 Plains- man Rifle | .22 S, .22 L, .22 LR | 5-shot clip magazine | 5 lbs | 22" |
| H&R 866 Plains- man Rifle | Same as 865 except has Mannlicher style stock | | | |
| Marlin 780 Bolt Action Rifle | .22 S, .22 L, .22 LR | 7-shot clip magazine | 5½ lbs | 22" microgroove |
| Marlin 781 Bolt Action Rifle | Same as 780 except tubular magazine holds 25 S, 19 L, or 17 LR cartridges 6 lbs | | | |
| Marlin 782 Bolt Action Rifle | Same as 780 except .22 Rimfire Magnum only 6 lbs | | | |
| Marlin 783 Bolt Action Rifle | Same as 788 except tubular magazine holds 13 rounds of .22 Rimfire Magnum ammunition | | | |
| Marlin Glenfield 20 Bolt Action Repeater | Similar to 780 except checkered stock, without Monte Carlo | | | |

| Barrel | Length Overall | Sights | Features |
|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------|
| 20½" | 39" | Bead post front, step adj. rear; grooved for tip-off scope | Cross-bolt safety |
| Same as 290 except no checkering, no pistol grip or buttplate spacer | | | |
| | | | |
| Length Overall | Sights | Features | |
| 44¼" | Blade ramp front, adj. aper- ture rear | Straight pull-back breech bolt side ejection; right or left hand | |
| 39" | Blade front, step adj. open rear; grooved for tip-off scope | Cocking indicator sliding side safety | |
| Same as 865 except has Mannlicher style stock | | | |
| 41" | Blade on band ramp front, open adj. rear; grooved for tip-off scope | | |
| Same as 780 except tubular magazine holds 25 S, 19 L, or 17 LR cartridges | | | |
| Same as 780 except .22 Rimfire Magnum only | | | |
| Same as 788 except tubular magazine holds 13 rounds of .22 Rimfire Magnum ammunition | | | |
| Similar to 780 except checkered stock, without Monte Carlo | | | |

U.S. Rimfire Rifles: Bolt Action (Cont.)

| Model | Caliber | Capacity | Weight | Barrel |
|-----------------------------------------------|---------------------------------------------------------------------------|--------------------------------------|--------|--------|
| Mossberg 341 Rifle | .22 S, .22 L. .22 LR | 7-shot clip | 6½ lbs | 24" |
| Mossberg 640K Chuckster | .22 WMR Mag. | 5-shot clip magazine | 6 lbs | 24" |
| Remington 541S Custom Sporter | .22 LR | 5-shot clip or 10-shot clip magazine | 5½ lbs | 24" |
| Remington 581 Rifle | .22 S, .22 L, .22 LR | 5-shot clip magazine | 4¾ lbs | 24" |
| Remington 582 Rifle | Same as 581 except tubular magazine holds 20 S, 15 L, or 14 LR cartridges | | 5½ lbs | |
| Remington 591 Rifle | 5mm RFM | 4-shot clip magazine | 5 lbs | 24" |
| Remington 592 Rifle | Same as 591 except tubular magazine holds 10 5mm RFM cartridges | | | |
| Savage/Anschutz 164 Bolt-Action Rifle or 164M | .22 LR or .22 WRM | 5-shot clip 4-shot for magnum | 6 lbs | 24" |
| Savage/Anschutz 184 Bolt-Action Rifle | .22 LR | 5-shot clip | 4½ lbs | 21½" |
| Savage/Anschutz 54 Sporter or 54M | .22 LR or .22 M | 5-shot clip | 6¾ lbs | 23" |

| Length Overall | Sights | Features |
|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| 43½" | Open, U-notch, adj. rear, ramp front with bead; grooved for scope | Sliding side safety; 3-way clip adjusts to S, L, or LR; hammerless |
| 44¾" | Ramp front with bead, adj. leaf rear, grooved for tip-off scope, tapped for aperture rear sight | Sliding side safety |
| 42⅝" | None; tapped for scope mounts or receiver sights | Thumb safety |
| 42⅜" | Bead post front, adj. open rear; grooved for tip-off scope | Sliding side safety; right or left hand |
| Same as 581 except tubular magazine holds 20 S, 15 L, or 14 LR cartridges | | |
| 42¾" | Bead post front, adj. open rear; grooved for tip-off scope | Sliding thumb safety; detachable sights |
| Same as 591 except tubular magazine holds 10 5mm RFM cartridges | | |
| 40¾" | Hooded ramp gold bead front, folding leaf rear; grooved for tip-off scope | Sliding side safety, adj. single stage trigger; Model .164M in .22WRM 4 shot |
| 39½" | Hooded ramp gold bead front, folding leaf rear, grooved for scope | Side safety |
| 42" | Hooded ramp gold bead front, folding leaf rear; grooved for tip-off scope; tapped for scope | Wing safety, adj. trigger; Model .54M is .22 Magnum |

U.S. Rimfire Rifles: Bolt Action (Cont.)

| Model | Caliber | Capacity | Weight | Barrel |
|----------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------|--------|
| Savage 65 Rifle or 65M | .22 LR or .22 M | 5- or 10-shot clip; Mag.— 5-shot clip | 5 lbs | 20" |
| Savage & Stevens 34 Rifle | .22 LR or .22 M | Same as 65 except bead post front slight, walnut stock | | |
| Savage & Stevens 46 Rifle | Same as 34 except tubular magazine holds .22 S, .17 L, or .15 LR. Comes in .22 LR only (no Magnum) | | | |
| Western Field 332 Bolt Action Rifle | .22 S, .22 L, .22 LR | 7-shot clip | 6½ lbs | 24" |
| Winchester 320 Bolt Action Repeater | .22 S, .22 L, .22 LR | 5-shot clip | 5½ lbs | 22" |

U.S. Rimfire Rifles: Lever Action

| Model | Caliber | Capacity | Weight | Barrel |
|--------------------------------------------|-------------------------|----------------------------------------|--------|----------------------|
| Browning BL-22 Lever Action | .22 S, .22 L, .22 LR | S-22, L-17, LR-15, tubular magazine | 5 lbs | 20" |
| Ithaca 72 Saddlegun | .22 LR | 15-shot tubular magazine | 5 lbs | 18½" |
| Marlin 39D Lever Action Carbine | .22 S, .22 L, .22 LR | S-21, L-16, LR-15 tubular magazine | 5¾ lbs | 20" |
| Marlin Golden 39A Lever Action Rifle | .22 S, .22 L, .22 LR | S-26, L-21, LR-19 tubular magazine | 6¾ lbs | 24" micro- groove |

| Length Overall | Sights | Features |
|----------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| 39" | Gold bead ramp front, adj. open rear; grooved for tip-off scope | Sliding side safety; Model 65M is .22 Magnum |
| | | Same as 65 except bead post front slight, walnut stock |
| | Same as 34 except tubular magazine holds .22 S, .17 L, or .15 LR. Comes in .22 LR only (no Magnum) | |
| 43" | Ramp front, adj. rear | Thumb-operated safety |
| 39½" | Bead on ramp front, step adj. rear; tapped for scope and micrometer sights | |

| Length Overall | Sights | Features |
|----------------|--------------------------------------------------------------------------------|--------------------------------------------|
| 36¾" | Bead post front, folding-leaf rear; grooved for tip-off scope | ½ cock safety, short throw lever; 2 grades |
| | Hooded front, step-adj. rear; grooved for scope | Half-cock safety |
| 36½" | Blade front, semibuckhorn adj. rear; tapped for a scope or aperture sights | Offset hammer spur |
| 40" | Bead ramp front with detachable hood, rear adj. semibuckhorn; tapped for scope | Offset hammer spur |

U.S. Rimfire Rifles: Lever Action (Cont.)

| Model | Caliber | Capacity | Weight | Barrel |
|-------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|--------|----------------------|
| Marlin 39A Octagon | Same as 39A except 24" octagon barrel | | | |
| Marlin Golden 39M Carbine | .22 S, .22 L, .22 LR | S-21, L-16, LR-15 tubular magazine | 6 lbs | 20" micro- groove |
| Marlin 39M Octagon | Like 39M Carbine except 20" octagon barrel | | | |
| Marlin 39 Century Ltd. | Like 39M Carbine except 20" octagon barrel | | | |
| Winchester 250 Lever Action Rifle | .22 S, .22 L, .22 LR | S-21, L-17, LR-15 | 5 lbs | 20½" |
| Winchester 150 Lever Action Carbine | Like 250 except straight stock, no checkering | | | |
| Winchester 9422 Lever Action Rifle | .22 S, .22 L, .22 LR | S-21, L-17, LR-15 | 6½ lbs | 20½" |
| Winchester 9422M | Like 9422 except chambered for .22 WMR cartridge with 11-round magazine capacity | | | |

U.S. Rimfire Rifles: Slide Action

| Model | Caliber | Capacity | Weight |
|--------------------------------------------------|-------------------------|----------------------|--------|
| High-Standard Sport King Pump Action Rifle | .22 S, .22 L, .22 LR | S-24, L-19, LR-17 | 5½ lbs |

**Length
Overall**

Sights

Features

Same as 39A except 24" octagon barrel

36"

Bead ramp front with hood,
semibuckhorn adj. rear;
tapped for scope or
receiver sight

Offset hammer spur

Like 39M Carbine except 20" octagon barrel

Like 39M Carbine except 20" octagon barrel

39"

Bead post front ramp, step
adj. open rear; grooved for
tip-off scope

Cross-bolt safety

Like 250 except straight stock, no checkering

37½"

Hooded ramp front, adj.
semibuckhorn rear;
grooved for scope

Side ejection

Like 9422 except chambered for .22 WMR cartridge
with 11-round magazine capacity

Barrel

**Length
Overall**

Sights

Features

24"

41¾"

Post front and rear
sight with stepped
blade

Cross-bolt safety

U.S. Rimfire Rifles: Slide Action (Cont.)

| Model | Caliber | Capacity | Weight |
|------------------------------------------|--------------------------------------------------------------------------------|-----------------------------|--------|
| Remington 572 Fieldmast Pump Rifle | .22 S, .22 L, .22 LR | S-20, L-17, LR-14 | 5½ lbs |
| Remington 572SB | Like 572 except smoothbore bbl. for .22 LR shot cartridges | | |
| Remington 572 BDL Deluxe | Like 572 except ramp front and adj. rear sights, special finish, checkering | | |
| Winchester 270 Slide Action | .22 S, .22 L, .22 LR, .22 WMR | S-21, L-17 LR-15, WMR-11 | 5 lbs |

U.S. Rimfire Rifles: Single Shot

| Model | Caliber | Weight | Barrel |
|----------------------------------------|---------------------------------------------------------------------|--------|-------------------------|
| Garcia Bronco .22 Rifle | .22 S, .22 L, .22 LR | 3 lbs | 16½" |
| H&R 750 Pioneer | .22 S, .22 L, .22 LR | 5 lbs | 22" |
| Ithaca 49 Saddlegun | .22 S, .22 L, .22 LR, .22 WRM | 5½ lbs | 18" |
| Also comes in fancy presentation model | | | |
| Ithaca 49 Deluxe | Same as 49 except figured stock, gold plated trigger, and hammer | | |
| Marlin 101 Single- Shot Rifle | .22 S, .22 L, .22 LR | 4½ lbs | 22" micro- groove |

| Barrel | Length Overall | Sights | Features |
|--------|----------------|-----------------------------------------------------------------|-------------------|
| 24" | 42" | Bead post front, step-adj. open rear; grooved for tip-off scope | Cross-bolt safety |

Like 572 except smoothbore bbl. for .22 LR shot cartridges

Like 572 except ramp front and adj. rear sights, special finish, checkering

| | | | |
|------|-----|-----------------------------------|--|
| 20½" | 39" | Ramped bead post front, adj. rear | |
|------|-----|-----------------------------------|--|

| Length Overall | Sights | Features |
|----------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| 32" | Protected blade front, adj. rear | Cross-bolt safety, swing-out chamber, ultra lightwt. |
| 39" | Blade front, adj. open rear; grooved for tip-off mount and tapped for aperture sight | Cocking indicator, sliding side safety; bolt action |
| 34½" | Bead front post, adj. open rear | Rebounding hammer safety, lever action; can be ordered with youth stock |

Also comes in fancy presentation model

Same as 49 except figured stock, gold plated trigger hammer

| | | |
|-----|--------------------------------------------------------------------------|---------------------------------------------------------|
| 40" | Blade band ramp front, semibuckhorn rear adj.; grooved for tip-off scope | Bolt action, shaped cocking knob; manual cocking action |
|-----|--------------------------------------------------------------------------|---------------------------------------------------------|

U.S. Rimfire Rifles: Single Shot (Cont.)

| Model | Caliber | Weight | Barrel |
|---------------------------------------|-------------------------------------------|--------|--------|
| Marlin Glenfield 10 Rifle | Same as 101 except checkered walnut stock | | |
| Remington 580 Single-Shot Rifle | .22 S, .22 L, .22 LR | 4¾ lbs | 24" |
| | Also available smooth bore (580SB) | | |
| Savage & Stevens 73 Single-Shot Rifle | .22 S, .22 L, .22 LR | 4¾ lbs | 20" |
| Savage & Stevens 72 Crackshot | .22 S, .22 L, .22 LR | 4½ lbs | 22" |
| Savage & Stevens Little Favorite 74 | .22 S, .22 L, .22 LR | 4½ lbs | |
| Winchester 310 Rifle | .22 S, .22 L, .22 LR | 5½ lbs | 22" |

U.S. Target Rifles: Centerfire and Rimfire

| Model | Caliber | Capacity | Weight |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------|
| Anschutz 1411 Match 54 Rifle | .22 LR Rimfire | Single shot | 11 lbs |
| Anschutz 1413 Super Match Rifle | Like 1411 except international type stock with adj. cheekpiece and adj. aluminum buttplate. Weight 15½ lbs, 50" overall. Also in left hd. Avail. Savage Arms. | | |

| Length Overall | Sights | Features | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Same as 101 except checkered walnut stock | | | |
| 42 $\frac{3}{8}$ " Also available smooth bore (580SB) | Bead post front, screw lock adj. rear; grooved for tip-off mount | Bolt action, sliding side safety; available with 1" shorter youth stock | |
| 38 $\frac{1}{2}$ " | Bead post front, step adj. open rear | Bolt action cocks on opening; auto. safety; key locks trigger; also with youth model stock (73-Y) | |
| 37" | Blade front, step adj. rear | Deluxe version of 74 | |
| 37" | Blade front, step adj. open rear | Hammer must be manually cocked before each shot | |
| 39 $\frac{1}{2}$ " | Bead post ramp front, step adj. open rear; grooved for tip-off scope and tapped for aperture sights | Sliding side safety; bolt action | |
| | | | |
| Barrel | Length Overall | Sights | Features |
| 27 $\frac{1}{2}$ " | 46" | None; grooved for Anschutz sights; scope blocks | Single-stage adj. trigger, wing safety; avail. Savage Arms; also in lft. hand |
| Like 1411 except international type stock with adj. cheekpiece and adj. aluminum buttplate. Weight 15 $\frac{1}{2}$ lbs, 50" overall. Also in left hd. Avail. Savage Arms. | | | |

U.S. Target Rifles: Centerfire and Rimfire (Cont.)

| Model | Caliber | Capacity | Weight |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Anschutz 1407 Match 54 Rifle | Like 1411 except 26" bbl., 10 lbs, 44½" overall. Also in left hand. Avail. Savage Arms. | | |
| Savage/Anschutz 64 Match Rifle | .22 LR Rimfire | Single shot | 7¾ lbs |
| Mossberg 144 Super Target Rifle | .22 LR Rimfire | 7-shot clip | 8 lbs |
| Mossberg 340B Target Sporter | .22 S, .22 L, .22 LR Rimfire | 7-shot clip | 6 lbs |
| Remington International Free Rifle | .22 LR (rimfire), .222 Rem., .222 Rem. Mag., .223 Rem., .308 Win., .30/06 | Single shot | 15 lbs |
| Remington 40-XB Rangemaster Target Centerfire | .222, .222 Rem. Mag., .223, .22/250, 6x47, 6mm Int., 6mm Rem., .243, .25/06, 6.5mm Rem. Mag., 7mm Rem. Mag., .30/338, .30/7mm Rem. Mag., .300 Win. Mag., .308, .30/06 | Single shot; also avail. in repeating models in .222, .222 Rem. Mag., .223, .243, 6x47, 6mm Rem., 6mm Int., .22/.250, 308 | 9¼ lbs Std. 11¼ lbs Hvy. |

| Barrel | Length Overall | Sights | Features |
|-----------------------------------------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Like 1411 except 26" bbl., 10 lbs, 44½" overall. Also in left hand. Avail. Savage Arms. | | | |
| 26" | 44" | None; scope blocks; grooved for Anschütz sights | Sliding side safety, adj. single stage trigger; also in lft. hand |
| 26" | 43" | Lyman 17A hooded front with inserts, Mossberg S331 rear peep with ¼ minute clicks; grooved for scope | Adj. trigger, thumb safety; hammerless, bolt action |
| 24" | 43½" | Mossberg S331 peep sight with ¼ minute clicks, and Mossberg S320 hooded ramp front sight; grooved for scope | Positive side safety |
| 27¼" | 47" | None; scope blocks installed | 40-XB bolt action, 2 oz. trigger; all exc. .22 LR are centerfire |
| 27¼" | 47" | None; scope blocks; tapped for sights | Adj. trigger; std. or stainless steel, single or repeating; all centerfire; bolt action |

U.S. Target Rifles: Centerfire and Rimfire (Cont.)

| Model | Caliber | Capacity | Weight |
|--------------------------------------------------|----------------------------------------------------------|-----------------------------|------------------------------------|
| Remington 40-XB Rangemaster Target Rimfire | .22 LR | Single shot | 10¾ lbs — std. 12 lbs —heavy |
| Remington 40XB-BR | .222, .222 Rem. Mag., .223, 6x47, .308, Centerfire | Single shot or repeating | 7¼ lbs or 12 lbs |
| Remington 540X Match Target Rifle | .22 LR Rimfire | Single shot | 8½ lbs |
| Winchester 52D Bolt- Action Target Rifle | .22 LR Rimfire | Single shot | 9¾ lbs std or 11 lbs heavy |
| Winchester 70 Int'l Army Match Rifle | .308 | 5-shot | 11 lbs |
| Winchester 70 Target Rifle | .308 and .30/06 | 5-shot | |
| Winchester 52 International Match Rifle | .22 LR Rimfire | Single shot | 13½ lbs |

Imported Centerfire Rifles: Autoloading

| Model | Action | Caliber | Capacity | Weight |
|-------------------------------|---------------------------|---------|--------------------------------------------|--------|
| Beretta M-59 Assault Rifle | Semiauto, gas operated | .308 | 20-round box magazine (de- tachable) | 8½ lbs |

| Barrel | Length Overall | Sights | Features |
|-----------------------|-------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------|
| 28" std. or heavy | 47" | None; tapped for sights and scope | Thumb safety, adj. trigger; bolt action |
| 20"—light 26"—hvy. | 38" or 44" | None; scope blocks | Adj. trigger from 1½ to 3½ lbs; bolt action |
| 26"—hvy. | 43½"—47" | Optional; Readfield #75 rear sight with ¼ min. clicks, #63 Globe front sight with 7 inserts | Adj. trigger; bolt action; adj. stock |
| 28" | 46" | None; tapped for front sight bases | Adj. trigger |
| 24" | 43¼" | None; tapped for M 70 sights | Vertically adj. butt-plate; adj. trigger; bolt action |
| 24"—hvy. | 42½" | Tapped for micrometer sights | Similar to 70 std. bolt action |
| 28"—hvy. | 44½" | Tapped for sights and scope bases; scope blocks included | Nondrag trigger |

| Barrel | Length Overall | Sights | Features |
|--------|-------------------|------------------------|--------------------------------------------|
| 21" | | Blade front, adj. rear | Compensator flash hider. From Fed. Ornando |

Imported Centerfire Rifles: Autoloading (Cont.)

| Model | Action | Caliber | Capacity | Weight |
|-----------------------------|---------------------------|----------------|-------------------------------------------|---------|
| Beretta BM-69 Auto Rifle | Semiauto, gas operated | .308 | 20-round magazine | 8½ lbs |
| Cetme Sport Auto Rifle | Semiauto, gas operated | .308 | 5-shot or 20-shot magazine avail. | 10½ lbs |
| Valmet M-62S Rifle | Semiauto, gas piston | 7.62 x 39mm | 15- and 30-shot detachable magazine | |

Imported Centerfire Rifles: Bolt Action

| Model | Caliber | Capacity | Weight |
|---------------------------------------|------------------------------------------------------------------------------|------------------------|-------------------|
| BSA Monarch Bolt-Action Rifle | .22/250, .222, .243, .270, .308, .30/06, 7mm Rem. Mag., .300 Win. Mag. | Hinged floor- plate | 7 lbs |
| Churchill "One of One Thousand" | .270, .308, .30/06, 7mm Rem. Mag., .300 Win. Mag., .375 H&H, .458 Win. | Hinged floor- plate | 8 lbs (.30/06) |
| Dschullnigg Bolt-Action Rifle | All standard calibers | | 7 lbs |
| Dumoulin Bolt-Action Rifle | All commercial calibers | | 7 lbs |
| FN Mauser Bolt-Action Rifle | .243, 7x57, .270, .308, .30/06, .264 Mag., 7mm Mag., .300 Win. Mag. | Hinged floor- plate | 8½ lbs |

| Barrel | Length Overall | Sights | Features |
|--------|-------------------|--------------------------------------------------|-------------------------------------------------------------|
| 17" | 38½" | Post front, adj. peep rear | From Italy by Gold Rush |
| 17¾" | 40" | Blade front, flip-up aperture rear; scope blocks | From Spain by Mars Equipment |
| 16⅝" | 36⅝" | Hooded post front, tangent peep rear | Finnish. Imported by Interarms, metal or wood stock version |

| Barrel | Length Overall | Sights | Features |
|----------------|-------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------|
| 22" | | Hooded ramp front, flip-up rear | Adj. trigger, sliding safety locks bolt trigger. From England by Galef |
| 24" average | 44" (24" bbl.) | Hooded gold bead ramp front, 3-leaf folding rear | Mauser action, adj. trigger; lifetime guarantee; only 1,000 made. By Churchill, Ltd. |
| 24" or 26" | | Fixed iron sights or choice of European scopes and mounts | Grade IV engraved or custom grd. (to buyers' specification). From Austria by Firearms Center |
| 25" | 43" | Optional, avail. at extra cost | Sako or FN action; custom-made with/without engraving; 3 grades. Belgium by Firearms Center |
| 24" | | Hooded front, adj. peep rear | Adj. trigger, sliding safety. From Belgium by Garcia |

Imported Centerfire Rifles: Bolt Action (Cont.)

| Model | Caliber | Capacity | Weight |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------|
| Carl Gustav Grade II | .22/250, .243, 6mm Rem., .250 Savage, .257 Roberts, .25/06, 6.5 x 55, .270, 7 x 57, .280 Rem., .30/06, .308, .358, .35 Whelen Imp. | 5-shot, 3-shot magazine; hinged floor- plate | 7½ lbs |
| Carl Gustav Grade II Magnum | .264 Win., 7mm Rem., .300 Win., .308 Norma, .338 Win., .358 Norma, .458 Win. (all Magnum) | Same as Grade II except as noted | |
| Carl Gustav Grade III | .22/250, .243, 6mm Rem., .250 Sav., .257 Rob., .25/06, 6.5 x 55, .270, 7 x 57, .280 Rem., .30/06, .308, .358, .35 Whelen Imp. | 5-shot, 3-shot magazine, en- graved floor- plate | 7½ lbs |
| Carl Gustav Grade III Magnum | Like Grade III except internal modifications to handle magnum calibers. Also in left-hand version | | |
| Carl Gustav "Swede" | In standard or deluxe versions using Grade II or Grade III barreled actions. Standard or deluxe model | | |
| Carl Gustav Grade V | In any caliber listed for all other Gustav rifles. Std. or Magnum calibers | Floorplate | 7½ lbs |
| Carl Gustav V-T | .222, .22/250, .243, 6.5 x 55, .17 Rem., .223, 6mm Rem., .25/06 | | 9½ lbs |
| Carl Gustav CG-T | 6.5 x 55, .308, .30/06 | Single shot, 5- shot magazine | 11½ lbs |
| Herter's Mark J9 Rifle | .22/250, .25/06, 6mm, .270, .308, .30/06, .264, 7mm Mag., .300 Win. Mag. | | 8 lbs |

| Barrel | Length Overall | Sights | Features |
|----------------------------------------------------------------------------------------------------------|-------------------|-----------------------------------------|---------------------------------------------------------------------------------|
| 23½" | 44" | Hooded ramp front, folding leaf rear | Adj. trigger, silent safety; also in left hand. From Sweden by FFV Sports |
| Same as Grade II except as noted | | | Rubber recoil pad; also in left hand version |
| 23½" | 44" | None furnished | Also in left hand version. From Sweden by FFV |
| Like Grade III except internal modifications to handle magnum calibers. Also in left- hand version | | | Recoil pad |
| In standard or deluxe versions using Grade II or Grade III barreled actions. Standard or deluxe model | | | |
| 24" | 44" | None; tapped for scope | Trigger guard; right or left hand. From Sweden by FFV |
| 27" | 47½" | None; tapped for scope | Adj. trigger. From Sweden by FFV |
| 26" | 46" | None; tapped for scope | From Sweden by FFV |
| 23½" | 42½" | Ramp front, adj. rear | 3 grades avail.; actions or barreled actions. From Yugoslavia by Herter's |

Imported Centerfire Rifles: Bolt Action (Cont.)

| Model | Caliber | Capacity | Weight |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------|----------------------------------------------|
| Herter's Mark U9 Rifle | .222, .222 Mag., .223, .22/250, .25/06, .243, 6mm, .284, .308, .270, .30/06, .264, 7mm Mag., .300 Win. | | 6¼ lbs |
| Kleinguenther K-14 Insta-Fire Rifle | .243, .25/06, .270, 7mm Rem. Mag., .30/06, .300 Win. Mag., .308, .308 Norma, .375 H&H, .458 Win. | Hidden clip | 7½ lbs |
| Mark X Rifle | .22/250, .243, .270, .308, .30/06, .25/06, 7mm Rem. Mag., .300 Win. Mag. | Hinged floor- plate | 7½ lbs |
| Mauser Model 3000 Barreled Actions | .243, .270, 7mm Rem. Mag., .375 H&H Mag. | | |
| Mauser 600 Rifle | .25/06, .243, .270, .308, .30/06, 7 x 57, 7mm Rem. Mag. | | 7¾ lbs |
| Mauser 660 Safari | .458 Win. Mag., .375 H&H Mag., 7mm Rem. Mag., .338 Win. Mag. | | 9 lbs |
| Sako Model 72 Bolt-Action Rifle | .222, .223, .22/250, .243, .308, .25/06, .270, .30/06, 7mm Mag., .300 Mag., .338 Mag., .375 H&H Mag. | Hinged floor- plate | 6½ lbs (23" bbl.); 7 lbs (24" bbl.) |
| Steyr-Mann- licher Model SL Carbine, L Bolt Rifle | .222, .222 Rem. Mag., .223 (Model SL); .22/250, 6mm Rem., .243, .308 (Model L) | 5-rd. detach- able rotary magazine | 6 lbs 6 oz |

| Barrel | Length Overall | Sights | Features |
|------------------------------------|------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| 23½" | 42½" | Ramp front, adj. rear | 3 grades, avail. as actions or bbl'd. actions, bench, target, or varmint versions. From England by Herter's |
| 24", 26" | 43½" | None; tapped for scope mounts | Adj. trigger; recessed bolt face. From Germany by Kleinguenther's |
| 24" | 44" | Ramp front with removable hood, folding leaf adj. rear | Sliding safety, adj. trigger avail.; actions or bbl'd. actions. Imported from Europe by Interarms |
| | | Tapped for scope and for sight bases | |
| 24" | 41" | Tapped for scope; iron sights avail. at extra cost | Interchangeable bbls., adj. trigger, push-button safety. From Germany by Mauser-Baum |
| 28" | | Fixed front and express rear sights | Same as 600 except as noted |
| 23" or 24" | | Hooded front, adj. rear | Adj. trigger. From Finland by Garcia |
| 20"— carbine, 23⅝"— rifle | 39"— carbine, 52½"— rifle | Hooded post front, adj. rear | Single- or double-set trigger; all avail. in heavy bbl. varmint model, without sights in .222, .223, and .22/250 only. From Austria by Stoeger Arms |

Imported Centerfire Rifles: Bolt Action (Cont.)

| Model | Caliber | Capacity | Weight |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------|
| Steyr-Mannlicher Model M Carbine, Model S Rifle | 7 x 57, .270, .30/06, (Model M); 7mm Rem., .257 Weatherby, .264, .300 H&H, .338, .375 H&H, and .458 Magnum (Model S) | 5-rd. detachable rotary magazine; 4-rd. in Magnum, Model S | 7 lbs |
| Walther KkJ Bolt Action | .22 Hornet | 5-shot | 5½ lbs |
| Walther SSV Bolt Action | Same as KkJ except 25½" barrel, 6½ lbs, no sights. Also available in .222 Remington | | |

Imported Centerfire Rifles: Lever Action

| Model | Caliber | Capacity | Weight |
|---------------------------------------|-------------------|----------------------------|-------------------------------|
| Sako Model 73 Lever-Action Rifle | .243, .308 | 3-shot detachable magazine | 6¾ lbs |
| Classic 1873 Lever-Action Rifle | .357 Mag., .44/40 | Tubular magazine | 7 lbs |
| Navy Arms 1873 Model Rifle or Carbine | .357 Mag., .44/40 | | 9 lbs—rifle 7½ lbs—carbine |

| Barrel | Length Overall | Sights | Features |
|-----------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------|
| 20"— carbine, 24"— rifle, 25½"— rifle only | 39"— carbine, 43"— rifle, 45"— rifle only | Hooded post, open rear | Single- or double-set trigger; Model S, single trigger only. From Austria by Stoeger Arms |
| 22½" | 41½" | Hooded ramp front, adj. rear; grooved for scope | Double-set triggers avail. From Germany by Interarms |

Same as KKJ except 25½" barrel, 6½ lbs, no sights. Also available in .222 Remington

| Barrel | Length Overall | Sights | Features |
|------------------------------------------------|-------------------|----------------------------------------------------------------|---------------------------------------------------------------|
| 23" | 42½" | Hooded front, dove-tail blocks for rear, scope, or iron sights | Side ejection, hammerless. From Finland by Garcia |
| 20" | 39" | Fixed front, adj. rear | Exact copy of 1873 Win. top ejection. From Italy by Gold Rush |
| 24"—rifle, octagon 20"—carbine, round | | Blade front, adj. rear | Sliding dust cover; lever latch. Imported by Navy Arms |

Imported Rimfire Rifles: Autoloading

| Model | Action | Caliber | Capacity | Weight |
|------------------------------------|----------|---------|-------------------------|--------|
| AP-15 Auto Rifle | Semiauto | .22 LR | 15- or 20-shot magazine | 6¾ lbs |
| Erma Em. I .22 Autoloading Carbine | Semiauto | .22 LR | 10- or 15-shot magazine | 5¾ lbs |
| Franchi Centennial Auto Rifle | Semiauto | .22 LR | 11-shot | 5½ lbs |
| Tradewinds Model 260 Auto Rifle | Semiauto | .22 LR | 5- or 10-shot magazine | 5¾ lbs |

Imported Rimfire Rifles: Bolt Action

| Model | Caliber | Capacity | Weight |
|-------------------------------------|---------|-------------------------------------------------------|---------|
| Carl Gustav CG-22T | .22 LR | | 9½ lbs |
| Kleingunther K-10 Bolt-Action Rifle | .22 LR | Single shot | 4.2 lbs |
| Kleingunther K-12 Bolt-Action Rifle | .22 LR | 5 or 10 shot | 5.7 lbs |
| Kleingunther K-13 Bolt-Action Rifle | .22 WMR | Same as K-12 except magnum caliber, weight is 5.9 lbs | |

| Barrel | Length Overall | Sights | Features |
|--------|-------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 20" | 38½" | Ramp front, adj. peep rear | Imported by Inter-Conti- nental Arms |
| 17¾" | 35⅝" | Fixed front, adj. rear; grooved for scope | Operates like U.S. M-1 carbine. From Germany by R. G. Industries |
| 21" | 39⅞" | Gold bead front, adj. rear; grooved for tip-off scope | Cross-bolt safety. Standard and Deluxe Grades. From Italy by Stoeger Arms |
| 22½" | 41½" | Ramp front with hood, 3-leaf folding rear; grooved for scope | Sliding safety. Imported by Tradewinds |

| Barrel | Length Overall | Sights | Features |
|--------|-------------------|------------------------------------------------------------|------------------------------------------------------------------------------|
| 19.7" | 46" | None; tapped for scope | Adj. trigger. From Sweden by FFV |
| 21¼" | 38¼" | Hooded front; Mauser type tangent rear | Thumb safety locks fir- ing pin. Imported from Europe by Kleingunther |
| 21¼" | 40" | Hooded front, 2 leaf folding rear; grooved for scope | Adj. trigger, thumb lever safety. Imported from Europe by Kleingunther |

Same as K-12 except magnum caliber, weight is 5.9 lbs

Imported Rimfire Rifles: Bolt Action (Cont.)

| Model | Caliber | Capacity | Weight |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------|--------|
| Tradewinds Model 311 Bolt-Action Rifle | .22 LR | 5- or 10-shot magazine | 6 lbs |
| Walther KKJ Rimfire Rifle | .22 LR .22 WRM | LR—5 or 8 shot WRM—5 shot | 5½ lbs |
| Walther SSV Rimfire Rifle | Same as KKJ except 25½" barrel, heavier Monte Carlo stock, 6¾ lbs, .22 LR only. Double set trigger extra. | | |

Imported Rimfire Rifles: Pump Action

| Model | Caliber | Capacity | Weight |
|--------------------------|--------------------------------------------|-----------------------|--------|
| Rossi Gallery Pump Rifle | .22 S .22 L .22 LR .22 RFM (Mag.) | 20-S 16-L 14-LR | 5¼ lbs |

Imported Rimfire Rifles: Lever Action

| Model | Caliber | Capacity | Weight |
|---------------------------------|---------------------------------|----------|-------------|
| Erma EG 71 Lever-Action Rifle | .22 LR | 15-shot | 5 lbs, 5 oz |
| Navy Arms 66 Lever-Action Rifle | .22 LR .38 Special .44/40 | | 7 lbs |

| Barrel | Length Overall | Sights | Features |
|--------|----------------|------------------------------------------------------|----------------------------------------------------------------------|
| 22½" | 41¼" | Ramp front with folding leaf rear; grooved for scope | Sliding safety locks trigger and bolt handle. Imported by Tradewinds |
| 22½" | 41½" | Hooded ramp front, adj. rear; grooved for scope | Double set triggers extra. From Germany by Interarms |

Same as KKJ except 25½" barrel, heavier Monte Carlo stock, 6¾ lbs, .22 LR only. Double set trigger extra.

| Barrel | Length Overall | Sights | Features |
|--------|----------------|------------------------|-------------------------------------------|
| 22½" | | Fixed front, adj. rear | Standard or Magnum. From Brazil by Garcia |

| Barrel | Length Overall | Sights | Features |
|------------------------------------------------------------|----------------|-------------------------------------------|------------------------------------------------------------------------------|
| 18½" | 35⅞" | Fixed front, adj. rear; grooved for scope | Looks and operates like traditional .30/30. From Germany by R. G. Industries |
| 19" .22 LR also avail. with 16" barrel (trappers model) | 39½" | Fixed front, folding rear | Replica of Win. 1866 "Yellowboy," 3 grades. Imported by Navy Arms |

Imported Target Rifles: Centerfire and Rimfire

| Model | Caliber | Capacity | Weight |
|----------------------------------|----------------|-------------|-------------|
| Musgrave RSA NR1 Target Rifle | .308 | Single shot | 10 lbs |
| Parker-Hall. 1200TX Target Rifle | .308 .30/06 | | 10½ lbs |
| Walther U.I.T. Match Rifle | .22 LR | | 10 lbs 3 oz |
| Walther Running Boar Match Rifle | .22 LR | | 8 lbs 5 oz |
| Walther "Prone 400" Match Rifle | .22 LR | | |
| Walther KKM Match Rifle | .22 LR | | 15½ lbs |

| Barrel | Length Overall | Sights | Features |
|--------------|-------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| 26" heavy | 48½" | Musgrave tunnel front, takes Anschutz-type inserts; aperture rear with ½ min. clicks | Closed top bolt action, gas deflection ports, adj. trigger; Wing-type safety. From S. Africa by J. J. Sheldon Co. |
| 26" | 46¾" | Micro. adj. ¼ min. click rear, interchangeable element tub. rear | Adj. trigger. From England by Jana |
| 25½" | 44¾" | Interchangeable post or aperture front, micro. adj. rear | Adj. trigger. Left hand also avail. From Germany by Interarms |
| 23.6" | 42" | Globe front, micro. adj. rear; grooved for scope | Adj. cheekpiece and buttplate. For running boar competition. Imported from Germany by Interarms |
| | | With scope blocks | Especially designed for prone shooting with split stock to allow cheekpiece adjustment |
| 28" | 46" | Olympic front with post and aperture inserts, micro. rear click adj. | Adj. trigger. From Germany by Interarms |

Rifle Stock and Fit

The fit of a rifle is determined primarily by the shape and design of the rifle stock. Specifically, five parts are important:

1. Drop at heel and length of pull
2. Comb
3. Cheekpiece
4. Forend
5. Pistol grip

Drop at Heel

The drop at heel is determined by the slope of the comb from front to rear and is measured by an imaginary line running from the line of sight down to the heel of the stock. The drop at heel for an average man using open sights is usually $2\frac{1}{2}$ " to $2\frac{3}{4}$ ". If the drop is too great, the felt recoil is excessive. When scope sights are used, the drop is less, usually 2" to $2\frac{1}{2}$ ", since the eye must be on a higher plane to see through the scope.

The target rifle has straight stock to minimize the effects of recoil. The smaller the difference in drop between comb and heel, the less a rifle kicks. When a stock slopes downward toward the butt, the comb rises when the gun is fired, striking the shooter on the cheekbone. But when the stock is straight, with little or no drop at heel, the recoil brings the stock straight back against the shoulder, minimizing the kick. As long as the butt of the stock is wide and flat, the recoil will be distributed over a large area of the shoulder.

Length of Pull

The length of pull is the distance between the trigger and the butt. The length of pull varies, since different men and women have different arm lengths, but the shooter should be able to put his gun comfortably to his shoulder with his finger on the trigger. If the pull is too great, the butt will catch on his shoulder, or he will be unable to reach the trigger comfortably. If it is too short, it will be more difficult to hold the butt firmly to the shoulder while sighting. For the average man, a pull of $13\frac{3}{4}$ " to $13\frac{1}{2}$ " is about right. For the average woman, 13" is good. The table shows the recommended length of pull for different persons.

Length of Pull

| Size | Recommended Length of Pull |
|--------------------------|--------------------------------------|
| Tall men (6' 1"—6' 3") | $13\frac{3}{4}$ "—14" |
| Average men (5' 8"—6') | $13\frac{1}{4}$ "— $13\frac{1}{2}$ " |
| Short men, average women | 13"— $13\frac{1}{4}$ " |
| Short women, boys | $12\frac{3}{4}$ " |

Comb

A Monte Carlo stock has a comb that is raised to support the shooter's cheek, in order to bring the eye in line with a telescopic sight. (The telescopic sight is higher than an open sight.) The Monte Carlo has little value when an open sight is used, since it forces the shooter to squeeze his cheek

down uncomfortably on the comb to align his eye with the sights, causing an unnecessary blow on the cheek from the recoil. The comb should be of the proper height and thickness to insure that the shooter is able to put his eye quickly in line with the sights and to maintain a steady pressure on his cheek.

Cheekpiece

The cheekpiece should be so designed that the cheek rests comfortably on it. Ordinarily, this requires a flat surface. Also, the forward portion should merge smoothly into the comb, and the bottom should not extend out from the stock more than $\frac{1}{2}$ " to $\frac{3}{8}$ ".

Sometimes the comb of the Monte Carlo slopes upward toward the butt. This is a good design because the comb will recoil away from the face. If the shooter places his cheek up to the forward part of the comb, however, he does not receive much support and would do better to use a standard comb.

Forend

A well-designed forend is large enough to fill the hand. Circular or oval shapes are comfortable to hold and allow the shooter to grip them tightly, giving maximum control. Triangular or square forends are harder to hold, but the flat bottoms are useful for bench shooting, where a secure rest is desired.

Pistol Grip

The pistol grip should be of proper circumference so the shooter can hold the stock firmly and comfortably without undue strain, or without cramping the fingers. Generally, this means a round grip of about $4\frac{1}{2}$ " in diameter. Men with large hands may need about 5"; women and boys may find 4" comfortable.

Barrels

Length and Bullet Velocity

Does a rifle with a longer barrel produce a greater bullet velocity than one with a shorter barrel? Not necessarily; it depends on the amount and kind of powder used, the pressure achieved, and other factors. Regardless of barrel length, a bullet driven by slow-burning powder loses much more velocity than one using a small amount of fast-burning powder. For example, a .220 Swift loaded with No. 4350, a fairly slow-burning powder, loses more velocity in a 22" barrel than the same cartridge loaded with No. 3031, a medium-burning powder.

On high-powered rifles, which use one kind of powder, cutting barrel length usually decreases bullet velocity. For instance, velocities for the .243 Winchester are usually measured in a 26" barrel. With a 100-grain factory load, the velocity is 3,050, but in the popular Winchester Model 70 Featherweight with a 22" barrel, velocity is 2,925.

In other instances, a long barrel is a handicap. The .22 rimfire achieves its maximum velocity in about an 18" barrel and in some cases in a 16" barrel. If a 28" barrel is used, bullet velocity will actually be less.

Therefore, the relationship between bullet velocity and barrel length is variable, depending on the powder used, pressure achieved, and other factors. Generally, however, cutting off the barrel of a high-powered rifle does decrease bullet velocity, because the barrel is cut shorter than originally designed.

Rifling

Rifling is a system of spiral grooves cut into the rifle bore. They spin the bullet so that it will move steadily, nose forward, with a minimum of wobble toward the target. The grooves are the spiral cuts running the length of the barrel. Groove diameter is the measurement from the bottom of one groove to the bottom of the opposite groove. The raised portions of the bore between the grooves are lands, and the measurement between lands is the bore diameter.

The most common type of rifling today, so-called Enfield rifling, uses square lands and grooves. The number of grooves varies from two (found in Model 1903-A3 Springfields and in replacements made during World War II for Model 1917 Enfields), to sixteen shallow grooves such as those found in the Marlin Micro-Groove system. The

original Model 1903 Springfield with the .30/06 cartridge had four narrow lands and four wide grooves. Most factory-made high-powered rifle barrels have either four or six grooves. Neither has a particular advantage over the other.

Other forms of rifling were used in the past. These were the segmented or Metford, with lands and grooves with rounded-off edges, the oval-bore rifling with the oval turning as it moved down the barrel so the bullet would spin, and the parabolic rifling, which was similar to a rotating pinwheel when one looked down the barrel. Parabolic rifling was used around 1920. Oval-bore rifling was used at one time in both England and the United States. Metford rifling was used in Europe for blackpowder guns, because the black powder was not so likely to foul the barrel, since there were no sharp edges in the rifling.

Caliber

Some confusion exists as to how caliber is determined. In the United States, a common practice has been to use the bore diameter of the barrel as the first numerals in the name of a cartridge. The .30 Remington, the .270 Winchester, and the .219 Zipper are named in this way. But in recent years, the diameter of the barrel grooves has been used. The .243, the new .246 and .338 Winchester Magnums, and the .308 were named in this way. In other instances, neither bore nor groove diameter corresponds to caliber. The .280 Remington, for

example, has a bore diameter of .276 and a groove diameter of .284. The accompanying table shows some rifling specifications for other calibers.

Rifling Specifications for Different Calibers

| Caliber | Bore Diameter | Groove Diameter | Width Grooves | Number Grooves | Twist |
|--------------|---------------|-----------------|---------------|----------------|-------|
| .22 Short | .219 | .224 | .0688 | 6 | 24 |
| .22 L. R. | .217 | .222 | .0681 | 6 | 16 |
| .218 Bee | .219 | .224 | .074 | 6 | 16 |
| .22 Hornet | .217 | .222 | .0681 | 6 | 16 |
| .220 Swift | .2191 | .224 | .074 | 6 | 14 |
| .250/3000 | .250 | .256 | .0785 | 6 | 14 |
| .257 Roberts | .250 | .256 | .095 | 6 | 10 |
| .270 | .270 | .277 | .160 | 4 | 10 |
| .30/30 | .300 | .308 | .0942 | 6 | 12 |
| .30/06 | .300 | .308 | .176 | 4 | 10 |
| .32 Special | .305 | .311 | .099 | 6 | 16 |
| .375 Magnum | .366 | .376 | .115 | 6 | 12 |

There is some difference also between American and European practices. When bore diameter is .300", Americans cut the groove diameter to .308", with each groove cut to a depth of .004". They use bullets with a diameter equal to groove diameter. Europeans usually cut deeper grooves and use bullets somewhat smaller than groove diameter. Americans claim better accuracy; Europeans claim higher velocities and longer barrel life.

Twist

Twist is the rate at which the rifled grooves turn inside the barrel. It is always stated as one full

turn in a given number of inches. For example, a twist of 1-10 means one full turn in 10" of rifle barrel. Twist is used to keep the bullet from wobbling as it leaves the barrel. Without the proper amount of twist, the bullet would wobble much like a top. Spin a top too fast, and it wobbles before settling down to a smooth spin. Spin it too slowly, and it also wobbles.

What is the correct amount of spin for rifle bullets? This depends upon the bullet length, weight, shape, and velocity. The longer the bullet and the faster it moves, the sharper must be the twist. The .22 short bullet can be stabilized with a 1-24 twist, but a .22 Long Rifle bullet needs a 1-16 twist. The long high-velocity .30/06 needs a twist of 1-10.

The amount of twist needed will also depend on the weight of the bullet. For example, a 150-grain bullet may shoot well in a particular gun, but any bullet heavier than 150 grains will wobble or key-hole (enter the target sideways). When this happens, the shooter should not use the heavier-weight bullet if he wants the greatest accuracy. The most accurate twist is usually the one that will stabilize the heaviest bullet to be shot through the barrel at the longest ranges at which the rifle will be used.

The shape of the bullet also affects the ease or difficulty of keeping a bullet point on and accurate. Round-nosed bullets are easier to stabilize than those with sharp points, because their center of gravity is nearer the center of the bullet. A bullet with a long, sharp point is inherently unstable and requires a sharp twist to keep it accurate.

Sometimes a rifle will be accurate when it is new but inaccurate as it grows older. This usually happens because the twist has been minimal to start with, and it is not great enough to hold up as the barrel begins to wear. This is a special problem with the .32 Special. The rifling in this gun is barely adequate when new, so when the rifling starts to go the bullet starts to wobble and you cannot hit the broad side of a barn.

Generally, the shooter does not have to worry about twist, since most rifles are manufactured with a suitable amount. The table shows the amount of twist for barrels of some popular calibers.

Twist in Popular Calibers

| Caliber | Twist |
|------------------------|--------------|
| 17 Remington | 1-9 |
| .22/250 Remington | 1-14 |
| .222 Remington | 1-14 |
| .25/06 Remington | 1-10 |
| .243 Winchester | 1-9 |
| .270 Winchester | 1-10 |
| .30/06 | 1-10 |
| .308 Winchester | 1-10 |
| 7mm Remington Magnum | 1-9 |
| .264 Winchester Magnum | 1-9 |
| .350 Remington Magnum | 1-16 |
| .300 Winchester Magnum | 1-10 |
| .375 H&H Magnum | 1-12 |
| .458 Winchester Magnum | 1-14 |

Bullets

The jacket of the bullet is the envelope of metal

surrounding the soft lead core. Sometimes bullets are full-jacketed, as in military projectiles. At other times they are half-jacketed, meaning that the thin metal envelope extends only partially up the length of the bearing surface. Some bullets, of course, have no jacket at all. The cannelure of the bullet is a relatively shallow groove rolled into the bullet's surface to serve as a seat into which the case mouth may be crimped to secure the bullet tightly. Cannelures on lead bullets are also used to provide reservoirs for lubricant. The ogive is all the bullet forward of the bearing surface, regardless of shape.

Bullet Designations and Designs

Bullets are designated in a number of ways. They are designated by weight in grains, ranging from 15 grains for a special .22 short-gallery load to 500 grains for the .460 Weatherby, 510 grains for the largest .458 Winchester Magnum, and 900 grains for the British .600 Nitro Express. (One ounce = 480 grains.) Bullets may be designated by the material of the jacket (steel-jacketed or copper-jacketed) or by the material of the nose (silvertip—really tin—bronze-point, or lead). Bullets are also commonly designated by shape, such as pointed, round, hollow-point, flat-nosed, tapered-heel, boat-tail (also a tapered-heel bullet), hollow-base, Spitzer (a very sharply pointed nose), and so on. Bullets are also designated by the trade name of the manufacturer. Thus, the Partition bullet is a trade name used by the Nosler Bullet Company to designate a bullet that is partitioned by a

ring swaged into the jacket. The partition is solid, with only a very small hole in the center. A lead core is inserted into the nose and another into the base. (Such a design is intended to give optimum expansion and maximum penetration. The front half expands radically, and the back half penetrates deeply before expanding. Such a bullet is considered one of the best big-game designs.) Similarly, Weatherby, Norma, and DWM are designations of manufacturers.

One of the most important ways of designating bullets is by their expansion qualities. Some bullets practically shatter on impact, so are designated disintegration (D). Others, particularly the fully steel-jacketed bullets, hardly expand at all. In between are various types of expanding bullets and controlled-expansion bullets. Generally speaking, the softer, rounder, flatter, or more hollow points expand the fastest; those with more pointed, harder, jacketed points expand more slowly. The amount of expansion is determined by a combination of jacket thickness and strength, core hardness and amount of core exposed, the shape of the bullet core and point, striking velocity, and other variables. Expansion is controlled by a large number of different designs. The DWM strong-jacket bullet has an abnormally thick portion on the rear of the jacket, which penetrates but does not expand as fast as the softer front portion. The Nosler solid-base Zipido bullet has a completely solid base, which is too hard to be deformed by impact, allowing for maximum penetration of the base and

conventional expansion of the forward part. Remington's Core-Lokt bullets have scalloped edges on the jackets to insure uniform mushrooming, along with thicker jackets at the base to cut down the rate of expansion.

Bullet Abbreviations

The list shows some common abbreviations of bullet designations:

BP—Bronze point
BT—Boat-tail
C—Copper-plated
CL—Core-lokt
D—Disintegrating
DC—Dual-core
E—Expanding
FJ—Full-jacket
FMC—Full-metal-core
FMJ—Full-metal-jacket
FN—Flat-nosed
FP—Flat-point
HP—Hollow-point
HS—Hi-shok
HSP—Hollow soft-point
JHP—Jacketed hollow-point
K—Kopperklad
L—Lead
LU—Lubaloy
MAT—Match
MC—Metal case
NOSLER—Nosler
OPE—Open-point expanding
P—Pointed

PCL—Pointed core-lokt
PE—Pointed expanding
PEP—Positive expanded point
PL—Power-lokt
PP—Power-point
PSP—Pointed soft-point
R—Round
RN—Round-nosed
S—Spitzer
SP—Soft-point
SPE—Semipointed expanding
SPS—Semipointed soft-point
SS—Semi-Spitzer
ST—Silvertip
TH—Tapered heel

Frequently, of course, these abbreviations are used in combination, for example, PSPCL (pointed soft-point core-lokt), PP(SP) (power-point, soft-point), or CLSP (core-lokt, soft-point).

Sectional Densities

The sectional density of a bullet is a three-place decimal figure representing the ratio of bullet weight (in pounds) to a cross-sectional area (the square of the diameter in square inches). On the one hand, the higher the sectional density of a bullet, the less velocity loss over a long range and the deeper will be its penetration into a target. If a bullet has too high a sectional density, however, excessive chamber pressures prohibit loading the cartridge enough to produce high velocities within safety limitations. Therefore, unusually long, heavy bullets with sectional densities above .300 are sel-

Sectional Densities of Bullets

| Bullet | Sectional Density | Bullet | Sectional Density |
|----------------------|-------------------|----------------------|-------------------|
| .22 Caliber (.222") | | 6.5mm (.264") | |
| 40 Gr. | .114 | 100 Gr. | .206 |
| .22 Caliber (.223") | | 129 Gr. | .266 |
| 45 Gr. | .128 | 140 Gr. | .288 |
| .22 Caliber (.224") | | 160 Gr. | .330 |
| 45 Gr. | .128 | .270 Caliber (.277") | |
| 50 Gr. | .143 | 100 Gr. | .186 |
| 53 Gr. | .151 | 130 Gr. | .242 |
| 55 Gr. | .157 | 150 Gr. | .279 |
| 60 Gr. | .171 | 7mm (.284") | |
| 6mm (.243") | | 120 Gr. | .212 |
| 70 Gr. | .169 | 139 Gr. | .246 |
| 75 Gr. | .181 | 154 Gr. | .273 |
| 87 Gr. | .210 | 175 Gr. | .310 |
| 100 Gr. | .241 | 7.35mm (.300") | |
| .25 Caliber (.257") | | 128 Gr. | .202 |
| 60 Gr. | .130 | .30 Caliber (.308") | |
| 75 Gr. | .162 | 100 Gr. | .151 |
| 87 Gr. | .188 | 110 Gr. | .166 |
| 100 Gr. | .216 | 130 Gr. | .196 |
| 117 Gr. | .253 | 150 Gr. | .227 |
| 165 Gr. | .247 | 158 Gr. | .177 |
| 168 Gr. | .253 | .35 Caliber (.358") | |
| 170 Gr. | .257 | 200 Gr. | .224 |
| 180 Gr. | .272 | 250 Gr. | .280 |
| 190 Gr. | .286 | 275 Gr. | .308 |
| 220 Gr. | .332 | .375 Caliber (.375") | |
| .303 Caliber (.312") | | 270 Gr. | .275 |
| 150 Gr. | .218 | 300 Gr. | .306 |
| 174 Gr. | .252 | .44 Caliber (.429") | |
| .32 Caliber (.321") | | 240 Gr. | .186 |
| 170 Gr. | .234 | .44 Caliber (.430") | |
| 8mm (.323") | | 265 Gr. | .204 |
| 150 Gr. | .206 | .45 Caliber (.452") | |
| 170 Gr. | .233 | 185 Gr. | .127 |
| .338 Caliber (.338") | | .45 Caliber (.454") | |
| 200 Gr. | .250 | 250 Gr. | .173 |
| 225 Gr. | .281 | .45 Caliber (.458") | |
| 250 Gr. | .312 | 300 Gr. | .206 |
| .348 Caliber (.348") | | 350 Gr. | .243 |
| 200 Gr. | .236 | 500 Gr. | .347 |
| .35 Caliber (.357") | | | |

dom used. On the other hand, chunky, light bullets with low sectional densities lose velocity rapidly over long ranges, but they are satisfactory for short ranges, for example, in wooded areas. The table on page 77 gives some sectional densities of bullets of popular weights in standard calibers.

Cartridges and Cartridge Cases

Types of Cartridges

A cartridge is not the same as a bullet. A bullet is the projectile shot from a gun. The term "cartridge" refers to the case, powder, primer, and bullet together. It is incorrect to go into a store and ask for .22 bullets or .308 bullets, because they are really cartridges. In England, even shotgun shells are called shotgun cartridges.

Basically, there are three types of cartridges: rimfire, centerfire, and shotshells. Rimfires include all those cartridges in which the primer is sealed in the rim rather than the center of the base. The majority of "high-powered" cartridges today are centerfire, since their case heads can be made stronger to stand higher pressures. Rimfire cartridges are primarily of .22 caliber (except for the new 5mm Remington Rimfire Magnum). The cartridge cases of these small calibers do not have to be very strong, since the firing of the cartridge depends on the rim's being crushed by the firing pin.

Cartridges are also sometimes classified according to the game on which they are used. Thus the

.17 Remington, .22 Hornet, .218 Bee, or .222 Remington are known as varmint cartridges, since they are used on game like crows and woodchucks. Others, like the .30/30, the .32 Special, and the .303 Savage are primarily deer cartridges, while other bigger ones such as the .338 Winchester Magnum, .340 Weatherby Magnum, or .375 H&H Magnum are big-game cartridges. Such terms are relative, however, since cartridges such as the .30/06 are often used for big game, such as elk or moose, as well as for smaller game such as deer.

Cartridge Cases

Basically there are five types of cartridge cases: rimmed, semirimmed, rimless, rebated, and belted. The rimless case is the most commonly used design today, until you get into the magnum calibers, which more commonly use the belted case (the strongest design available). The rimmed cases were commonly used in many of the older types of cartridges, such as the .30/30 Winchester and the .32 Winchester Special. The .225 is a good example of a semirimmed cartridge.

Headspace

Headspace in a cartridge is the distance between the rear face of the case head and the forward face of the surface that arrests movement of the cartridge into the chamber. The rimmed cartridge is prevented from going farther forward into the chamber by the rim of the cartridge. The belted cartridge is held by the forward portion of the belt.

The rimless cartridge is held by the shoulder. Correct headspace is extremely important. When the headspace in the gun is greater than that of the cartridge, the cartridge case may rupture on firing, conceivably allowing blowback toward the shooter. What usually happens, however, is that the ruptured case expands to fill the chamber, preventing the hot gases from escaping to the rear.

Cartridge Numbers

There are basically three types of numbering systems used to designate cartridges: American, British, and European or metric. The original American system utilized three numerical indicators, such as .44/40/220 or .45/70/500. The first numeral indicated the bullet diameter in hundredths (or thousandths) of an inch, the second was the number of grains of black powder, and the third was the weight of the bullet in grains. When this system is used today, the bullet weight is dropped, so that we have designations like the .25/20, the .30/30, the .30/40, the .32/20, the .32/40, the .38/40, the .38/55, the .44/40, or the .45/70. The first numeral is the bullet diameter; the second is the powder weight. From looking at these numerals, one can tell immediately that a cartridge with 40 grains of powder is going to be considerably longer than one with 20 grains of powder. Generally, the name of the company that designed the cartridge is added, so that we have the .44/40 Winchester, for example. The .45/70 now comes in

the .45/70 Government 1873 Springfield and the .45/70 Government 1886 Winchester.

The most common American practice today is to designate the cartridge by the approximate diameter of the bullet, which in the United States is similar in diameter to the groove diameter of the rifle barrel. The .243, .246, and .308 are examples of this type of designation. But as we have seen in the section on rifle barrels, sometimes the cartridge number corresponds to the bore diameter of the barrel (as in the .219 Zipper or .270 Winchester). At other times it is only approximate and does not correspond to either bore or groove diameter (as in the .218 Bee, which has a bore diameter of .219 and a groove diameter of .224).

Occasionally the second numeral designates something other than powder weight or diameter. For example, the "06" in the .30/06 means the cartridge was adopted in 1906. The "3000" in the .250/3000 Savage indicates that the original velocity of the 87-grain bullet was 3,000 feet per second.

The British system designates case diameter (and bullet diameter when different from case diameter) and case length. The .577/3" has a cartridge case of .577 and a length of 3". The .577-.500/2¾" has a cartridge case diameter of .577, a bullet diameter of .500, and a cartridge case 2¾" long.

The third system of cartridge numbering is the metric system, which is used throughout most of

the rest of the world, and occasionally in the United States. This system uses three, four, or five designations. The first numeral indicates bore diameter in millimeters; the second indicates case length in millimeters. Thus, a cartridge designated 7.92 x 57 has a bore diameter of 7.92mm and a case length of 57mm. If an R is added, it indicates a rimmed case (e.g., 7.92 x 57R). In this particular caliber, two different bullet diameters have been used. J indicates a smaller diameter (.318") and S, the larger diameter (.323"). Thus, we might have a 7.92 x 57JR. In this example, the third and fourth designations indicate case type. The maker's name is sometimes added, for example, the 7 x 61mm Sharpe and Hart, or some flowery adjective, such as Magnum Bombe, to indicate high performance. American manufacturers have designated some cartridges with the metric system. The 6mm Remington and the 6.5 or 7mm Remington Magnums are good examples.

Cartridge Equivalents

The chart shows interchangeability of centerfire

Interchangeability Chart for Centerfire Rifle Ammunition

| Caliber | Centerfire Rifle |
|----------------|---------------------------------------------------|
| .22 Savage | 5.6 x 52R |
| .22 Hornet | 5.6 x 35R |
| .223 Remington | 5.56mm U.S.; 5.56 x 45mm; .223/5.56mm Military |
| .25 Remington | 6.5 x 52 |

Interchangeability Chart for Centerfire Rifle Ammunition (Cont.)

| Caliber | Centerfire Rifle |
|------------------------------------|--------------------------------------------------------------------------------------------------|
| .243 Winchester | 6 x 51mm Winchester |
| .25/35 Winchester | .25/35 WCF; 6.5 x 52R |
| 6.5mm Italian | 6.5mm Mannlicher-Carcano; 6.5 x 52mm Italian M1891 |
| 6.5mm Japanese | 6.5mm Arisaka; 6.5 x 50mm Japanese Arisaka |
| 6.5mm Swedish | 6.5 x 55mm; 6.5 x 55mm Mauser; 6.5mm Swedish Mauser; 6.5 x 55 Norwegian Krag |
| .270 Winchester | .270 WCF |
| 7mm Mauser | 7 x 57mm; 7 x 57mm Mauser |
| 7mm Remington Magnum | 7mm Magnum |
| 7.35mm Italian | 7.35mm Carcano; 7.35mm Terni; 7.35mm M38 |
| .30/30 Winchester | .30/30; .30/30 WCF; .30 WCF; 7.62 x 51R |
| .308 Winchester | 7.62mm NATO; 7.62mm U.S.; 7.62 x 51mm; 7.62mm M59 |
| .30/06 | .30/1906 U.S.; .300 U.S.; Cartridge .30.M2; Cartridge .30.M1; 7.62 x 63mm; .30 U.S. Gov't. |
| .300 H&H Magnum | Holland's Super .300; .300 H&H; .30 Super; .300 Belted Rimless Magnum |
| 7.7mm Japanese | 7.7 x 58mm; 7.7mm Arisaka |
| .303 British | .303 Enfield; 7.7 x 57R |
| 7.65mm Mauser | .30 Mauser; 7.65 x 53mm; 7.65mm Argentine Mauser; 7.65mm M1889 |
| 8mm Mannlicher-Schoenauer (M/1960) | 8 x 56 |
| 8mm Mauser | 8.57mm Mauser; 7.92 x 57mm |
| .358 Winchester | 8.8mm Winchester; .358 (8.8mm) Winchester |
| .375 Magnum | .375 Holland & Holland; .375 Belted Rimless Magnum Nitro Express; .375 H&H Magnum |

rifle ammunition. There are no American cartridges made or recommended for the 6.5mm Italian service rifles or the .5- or .30-caliber (6.5 or 7.7mm) Japanese rifles.

Centerfire Rifle Cartridges

.17 Remington. The lightest of the high-velocity (4,020 fps), flat-trajectory varmint cartridges. But the extremely light bullet (only 25 grains) is not as hard hitting as the .22s and is more susceptible to wind influence over long ranges. Limited usefulness.

.22 Hornet. The first high-speed .22 especially for varmint hunting, introduced in 1930. Flat trajectory and effective killing power out to 175 yards.

.218 Bee. A slightly greater velocity and flatter trajectory than the .22 Hornet. Introduced in 1968, but rifles for it are not sold today.

.222 Remington. Has largely replaced the old Hornet and Bee where a greater velocity and longer range is desired (effective range for varmints is 225 yards). A fine benchrest and varmint cartridge. Available in a number of bolt-action rifles.

.222 Remington Magnum. Although rifles are no longer made for this caliber, Remington ammunition is still available for rifles already in use. Along with the .223, it is one of the best varmint cartridges in use. Hard-hitting and flat trajectory out to about 250 yards.

.22/250 Remington. The most powerful, highest-velocity, flattest trajectory of any .22 caliber cartridge for guns on the market. Made in both 50

and 55-grain bullets. The favorite of those shooters who want the flattest trajectory at long ranges coupled with maximum striking power.

.220 Swift. The highest-velocity, flattest trajectory of any standard rifle cartridge ever produced commercially in the United States. Muzzle velocity for the 50-grain modern cartridge offered by Norma is 4,111 fps. The midrange trajectory at 300 yards is an unbelievable 3". Case life and barrel life are short, because of high velocities, but no other cartridge of this caliber has ever surpassed it for long-range varmit shooting. Unfortunately, new guns are no longer offered in this caliber.

.22 Savage Hi-Power. The 70-grain bullet is slower-moving than any of the other long-range .22 caliber bullets, except the .22 Hornet, but the foot-pounds of energy delivered at 300 yards is 525, compared to 135 foot-pounds in the .22 Hornet, 340 in the .222 Remington, 455 in the .223 Remington, and 490 in the .222 Remington Magnum. However, it is still less than the energy delivered by the .224 Weatherby Magnum (629 foot-pounds), the .225 Winchester (630), and the .22/250 Remington (760). When sighted in at 200 yards, the drop is only 4.5" at 250 yards. A good cartridge for those wanting a heavy .22 cartridge for large varmints at distances up to 250 yards.

.223 Remington. Slightly greater velocity and flatter trajectory than the .222. Similar ballistically to the .222 Magnum, but the case capacity of the .223 is slightly less and the neck is shorter. The .223 should not be used in .222, since excessive head-

space may result in case rupture. Used by the military as the 5.56mm.

.224 Weatherby Magnum (Varmintmaster). Ballistics are almost identical with the .225 Winchester, with the same weight (55-grain bullet). Available also in 50-grain bullets, which do not have nearly as flat a trajectory, nor are they as hard hitting at ranges 200 yards and over.

.225 Winchester. A semirimmed cartridge, which along with the .225 Weatherby Magnum has gained the reputation of ranking second only to the .22/250 Remington as the most powerful .22 centerfire. (Rifles for the .220 Swift are no longer made.) Available only in 55-grain bullets, it is an exceptionally accurate, long-range varmint or target cartridge.

.240 Weatherby Magnum. The highest-velocity and flattest trajectory of any of the .24 calibers, except for the .244 H&H Magnum. It has superior ballistics to both the .243 and 6mm, and comes in 70-, 90-, and 100-grain bullets. A versatile, long-range, accurate, hard-hitting choice for varmints, antelope, and deer.

.243 Winchester. One of the best for long-range varmint, antelope, and deer hunting. When sighted in at 250 yards and using a 100-grain bullet, the drop at 300 yards is only 3.5". The drop at 400 yards is 16.5", which is still acceptable for antelope and deer hunting if the hunter holds high. Use 80-grain bullets for varmints and 100-grain for deer. With 100-grain bullets, provides greater killing power than the same weight bullets in the .270 at

ranges of 400 yards and over. Excellent choice for open, long-range shooting for game no larger than deer.

6mm Remington and .244 Remington. The 6mm and .244 Remington cartridges can be used interchangeably, except bullets over 90 grains will not remain stabilized when shot out of the .244. Because the hunters wanted at least a 100-grain bullet, Remington ceased production of the .244 guns and ammunition and came out instead with the 6mm. Cartridges of this caliber may be obtained in 80, 90, or 100 grains, so they are useful for larger varmints or deer. Ballistics are comparable to the .243, so this is an excellent choice for long-range, open shooting.

.25/06 Remington. The finest .25 caliber made: hard-hitting, flat trajectory, with three different size bullets (87, 100, and 120-grain) to choose from. Thus, this is one of the best all-around cartridges for open-range hunting of both varmints and medium-size game (antelope, deer, sheep, goats). It is slightly superior ballistically to the 6.5mm Remington Magnum and only slightly inferior to the .270 Winchester. Use the 100-grain bullet for very long-range antelope and deer shooting, since this weight has the flattest trajectory.

.25/20 Winchester. An old-timer, originating in 1893, now made only in 86-grain bullets, which move at a slow velocity and are accurate only out to about 125 yards. There are better pest loads than this one, but it has killed its share of wild turkeys, rabbits, and varmints.

.25/35 Winchester. Its origin goes back to the 1890s. The 117-grain bullet can be used on deer at modest ranges out to about 200 yards (sight in at 150 yards), but the energy at that range is only 665 foot-pounds. Other .25 calibers (the .25/06 Remington, .250 Savage, and .257 Roberts) are far better choices.

.250/3000 Savage. A fine cartridge for varmints or deer, available in either 87 or 100-grain bullets. When sighted in at 200 yards, the drop at 250 yards is only 3.5". The ballistics are comparable to the .257 Roberts but quite inferior to the .243 Winchester, 6mm Remington, .240 Weatherby Magnum, and .25/06 Remington. Popular for more than forty years, it is still used a lot today, but better cartridges of similar caliber have been developed.

.256 Winchester Magnum. This short cartridge was developed both as a high-speed, flat-trajectory handgun cartridge and as a rifle cartridge. In comparison with other cartridges, this one is very powerful handgun ammunition but quite modest rifle ammunition. It cannot compare ballistically with other .25-caliber rifle cartridges, which are made with much greater powder charges. (Compare with .25/06, .250 Savage, or .257 Roberts.) It has a trajectory similar to the .25/35 Winchester and is quite accurate up to 200 yards, but at that range hits with less than half the striking power of the .25/35. About the only .25-caliber to which it is superior is the .25/20 Winchester.

.257 Roberts. Rifles of standard make are no longer chambered for this cartridge, but 87, 100,

and 117-grain commercial loads can still be obtained, so guns still available are quite versatile. Ballistics are comparable but slightly superior to the .250 Savage. Use 87-grain bullets for varmints, 100-grain for open-country deer shooting, and 117-grain for woods hunting.

.257 Weatherby Magnum. Has the flattest trajectory and highest striking energy of any .25-caliber cartridge, so may be used at extremely long ranges for varmints or smaller big game such as antelope.

6.5 Japanese. A .25-caliber cartridge with slightly less velocity and striking power than the 6.5 x 54 MS. Norma offers both 139-grain and 156-grain bullets, but the 139 is far superior, since both muzzle velocity and striking power of the 139 are far greater than on the 156. With 139-grain bullets, it is useful at modest ranges up to 200 yards but is inferior to the 6.5 x 55 Swedish (which is quite popular) or to the 6.5mm Remington Magnum.

6.5 Italian (Carcano). This cartridge, made by Norma in a 156-grain bullet, has the slowest muzzle velocity and weakest striking power of any of the 6.5mm imports, so is not as popular as its Japanese, German, or Swedish counterparts.

6.5 x 54 MS. Made for the old Mannlicher-Schoenauer carbines, which have been used on black bear in Maine for a number of years. Superior to both Japanese and Italian 6.5mm but inferior to the Swedish 6.5 x 55. Norma makes both 139 and 156-grain bullets, with the 139 the best choice by far. Effective, accurate range limited to 200 yards.

6.5 x 55mm (Swedish). The most popular of the 6.5mm imports, with the fastest muzzle velocity and hardest striking power. It has little recoil, is resistant to deflection by the wind, and quite accurate. The 139-grain bullet is the most popular. When sighted in at 200 yards, the bullet drops only 5" at 250 yards and 13" at 300 yards.

6.5 Remington Magnum. When using a 120-grain bullet, the trajectory compares favorably to the 6.5 x 55 (with 139-grain bullet), but the striking power is slightly less. The 100-grain bullet is excellent for larger varmints and antelope, and the 120-grain bullet useful on medium-size game such as deer. Not quite as powerful as the .25/06 when using the same 120-grain bullet weight.

.264 Winchester Magnum. Gives magnum power and velocity from a medium-short belted case. Has very flat trajectory and high energy at long ranges, and uses controlled expansion bullets in 100 or 140 grains. Best used for long-range shooting in flat country for antelope (100 grains), mule deer (140 grains), or long-range mountain shooting for sheep or goats (either weight bullet).

.270 Winchester. One of the best long-range cartridges for a variety of game. Obtained in 100, 130, or 150-grain loads. The 100-grain is useful on larger varmints, deer, and antelope; the 130-grain is useful on sheep, goats, and mule deer; the Winchester 150-grain with power-point bullet can be used on caribou, elk, or moose, while the somewhat slower 150-grain core-lokt is better designed for woods hunting. When sighted in at 250 yards,

the drop at 300 yards is only 3.5" and 4" respectively with the 100 and 130-grain bullets; at 400 yards, it is 14.5" and 16".

.270 Weatherby Magnum. Bullets are available in 100, 130, or 150-grain weights. While all are delivered at higher speeds and with greater energy than from the standard .270, the superiority of this magnum is best seen in the 150-grain loads. The standard .270 delivers a maximum of 1,550 foot-pounds of energy at 300 yards, but the Magnum delivers 1,967. Thus, the magnum is most useful for those who hunt big game at long ranges but, in the 100-grain bullets, can still be used for medium game.

.280 Remington. Slightly more powerful than the .270, with as fine or a little better ballistics. However, it is now available in only the 150- and 165-grain bullets, so its use must be limited to game like sheep, goats, deer, elk, and moose. Also, only the Remington 742 Autoloader is now chambered for it. A fine caliber, but never was able to replace the earlier .270.

.284 Winchester. A short, fat, rimless case offering maximum power and ballistics almost identical to the .270. Available in 125 and 150-grain bullets.

7mm Mauser. This is the 7 x 57, which originated in 1893 as a Spanish military cartridge. It is still very popular because of high velocities, flat trajectories, and a variety of loads available. Speer puts out 103, 139, and 162-grain bullets, Norma offers 110, 150, and 175, and Peters puts out 139 and 175. Light loads are excellent for varmints,

antelope, and other game in open country; medium loads are good for deer; heavy loads are good for brush shooting and big game such as elk and moose. An excellent, versatile choice for a variety of game.

7 x 61mm Sharpe and Hart. A very high-velocity, big-game load, available in only 160-grain bullets from Speer, with an even flatter trajectory and harder-hitting power at long ranges than the 7mm Remington Magnum.

7mm Remington Magnum. Tremendous striking power combined with a flat trajectory at long ranges have made this cartridge very popular for medium and medium-large game. Three cartridge weights (125, 150, and 175 grains) make this a flexible choice for antelope, deer, sheep, goats, elk, caribou, and moose. The 125-grain bullet has a slightly flatter trajectory and striking power comparable to the 130-grain .270. The 150-grain bullet has a flatter trajectory and much greater striking power than the same weight bullet in either the .270 or .30/06 calibers. In fact, it is equal to the .300 Winchester Magnum in both trajectory and energy delivered. Similarly, the 175-grain bullet is much superior to the 180-grain .30/06 in both trajectory and striking power and about equal to the .300 Winchester Magnum in both categories. Therefore, do not neglect this choice for all medium-large American game, except larger bear and buffalo.

7mm Weatherby Magnum. Almost identical to the 7mm Remington Magnum in trajectory and energy delivered. Loaded with 139 and 154-grain

bullets, this is an excellent choice for medium and large game.

.30 M-1 Carbine. A weak, slow-velocity cartridge loaded with 100-grain bullets. Even at 100 yards, it develops only 575 foot-pounds of energy, so is obviously too weak for deer and larger game. Might have limited usefulness for pests, but it is really not recommended for any use. The center-fire .22s, except the Hornet, all develop much more energy with a flatter trajectory, so they are preferred for varmints.

.30/30 Winchester. A favorite of old-time deer hunters, who fire them in light carbines. However, this should be considered only as a relatively short-range weapon. The 1,360 foot-pounds of energy (with a 150-grain load) is fine at 100 yards, but at 200 yards it has dropped to 960. The 170-grain bullet, however, develops 1,000 foot-pounds at 200 yards, so the larger load is probably better. To avoid crippling game, however, ranges of 150 yards and less are recommended.

.30 Remington. Rimless version of the .30/30 for autoloaders and slide-action guns, with only slightly less killing power and a not-quite-so-flat trajectory. Available in 170-grain bullets, so is best used as a brush gun at limited ranges not much over 100 yards. Has approximately the same killing power at 100 yards as the .30/06 at 300 yards, but poor killing power at ranges over 100 yards.

.300 Savage. A short cartridge developed for use in lever action rifles, it is loaded with either 150-grain or 180-grain bullets. It is far superior bal-

listically to the .303 Savage but has never equaled the .30/06. When sighted in at 200 yards, using the 150-grain bullet, the drop at 250 yards is only 3.5" but increases to about 11" at 300 yards. With the 180-grain bullet, the drop at 300 yards is about 15". Thus, the 180-grain is better used at shorter distances and in brush, and is adequate for game larger than deer, such as small bear, elk, moose, and caribou. Do not use it on dangerous bear, however.

.30/40 Krag. Rifles are no longer chambered with this caliber, but cartridges are still available in 180 and 220-grain bullets. A little more striking power and a flatter trajectory than the .300 Savage. Best used at modest ranges and as a brush gun. A 220-grain bullet penetrates deeply so is useful at medium ranges for heavy American game, except larger, more dangerous bear.

.30/06. The most popular big-game cartridge in the United States. A flat trajectory and bullet weights of 110, 125, 150, 180, and 220 make this a versatile, powerful weapon, useful on smaller game in open country and heavy game in the woods and brush. The 220-grain bullet has enough power for all large American game except grizzlies and Alaskan brown bear.

.300 Winchester Magnum. This cartridge is powerful at long ranges and has a very flat trajectory. With the 180-grain bullet, it delivers 2,380 foot-pounds of energy at 300 yards, or 480 more than the .30/06. When sighted in at 250 yards, the drop at 400 yards is only 14.5". Ballistics are sim-

ilar to the 7mm Remington Magnum, so this cartridge is also suitable for all larger American game except larger bear.

.300 H&H Magnum. This cartridge has more power than the .30/06, moving faster and developing more foot-pounds of energy, with a flatter trajectory. It does not come up to the superb performance of either the 7mm Remington Magnum or the .300 Winchester Magnum. It is a fine cartridge, however, and the 150 and 180-grain bullet weights are definitely medium-large game cartridges: sheep, goats, deer, elk, caribou, and moose.

.300 Weatherby Magnum. One of the finest all-around big-game cartridges. Bullet weights of 150, 180, and 220 grains allow a versatile usage for all American game the size of antelope and larger. The 150-grain load has a much flatter trajectory than the .270 and even flatter than the .308 Magnum, 7mm Remington Magnum, and the .300 Winchester Magnum, so this is an excellent choice for very long-range shooting. The 220-grain bullet is heavy enough to be a fine black bear, grizzly, polar bear, elk, caribou, and moose cartridge, and just big enough for Alaskan brown bear.

.303 Savage. Not quite as good ballistically as the .30/30. The heavy bullets (with high sectional densities) of 180 and 190 grains are best used in brush and wooded country at limited ranges. They have somewhat more penetrating power than the lighter bullets used in the .30/30.

.303 British. This cartridge is available in four bullet weights: 130, 150, 180, and 215 grains. The

180-grain loads are only a little better ballistically than the .30/40 Krag; the 215-grain load is much too heavy for the powder charge, moves too slowly, and so develops only 1,020 foot-pounds of energy at 300 yards, about equivalent to the .300 Savage (with a 150-grain bullet) at that distance. The 150-grain bullet performs better. The Norma loads with the 150-grain bullet are roughly equivalent to the .308 Winchester. The Norma 130-grain bullet develops 1,075 foot-pounds at 300 yards, so this load does only about as well as the 139-grain 7mm Mauser. In summary, this is an adequate deer cartridge, especially in the 150-grain bullet, but it will never break any records for performance.

.308 Winchester. The commercial equivalent of the 7.62mm Nato cartridge, designed with a short case for use in short actions. A powerful cartridge for its size, its ballistics with the 125-grain bullet almost equal those of the .30/06 but begin to fall behind in the 150 and 180-grain bullets. The wide choice of bullet size (110, 125, 150, 180, and 200 grains) makes this a versatile weapon, adequate for varmints, deer, elk, caribou, moose, and smaller bear. It is not quite heavy enough for dangerous game but may be used both in open country or in brush for other game. One advantage is that rifles of this caliber are much lighter to carry than the .30/06, especially in autoloaders.

.308 Norma Magnum. With the 180-grain bullet, the only load available, this delivers a little more power, with an even flatter trajectory, than the 7mm Remington Magnum and .300 Winchester

Magnum. The case is the same length as the .30/06, so by rechambering the barrel and opening up the bolt face, .30/06 rifles can be converted to shoot the .308 Norma Magnum. A high-performance cartridge that will handle all larger game, except more dangerous bear.

7.62 Russian. Loaded with 180-grain bullets, this cartridge does not have as much power as the .30/06, even though the trajectory is as flat. No real advantages for large game, but it is still a fine deer load, about equivalent to the 180-grain .308 Winchester.

7.65 Argentine Mauser. Loaded with the 150-grain bullet, the ballistics are similar to the .308 Winchester, so it is a fine deer load.

7.7 Japanese. Norma loads this with either 130- or 180-grain bullets. The 130-grain performs about like Norma's load for the .308. The 180-grain closely matches the 180-grain .308 Winchester in performance.

.32/20 Winchester. An old, outmoded cartridge that is the weakest of all centerfire cartridges discussed in this book (including the .17 Remington). Should not be used beyond 125 yards, and then only on small game like rabbits and turkeys.

.32 Remington. Loaded with the 170-grain bullet (the only one made), this is equivalent ballistically to the .30 Remington and the .303 Savage, but not quite as good a performer as the .30/30 or .32 Winchester Special. Useful on deer only out to about 100 yards.

.32 Winchester Special. An old favorite of many

brush-country deer hunters, with modest power (about 1,000 foot-pounds of energy) at 200 yards. Almost identical ballistically to the .30/30 Winchester and, like it, is best used for short ranges not much over 100 yards.

8mm Mauser. There are so many different cartridges of this approximate size that it is easy to become confused. The following is a list of available cartridges.

| | |
|----------------------------------------------------------------|------------|
| 8mm Mauser (Federal, Remington-Peters, and Winchester-Western) | |
| (.322") | 170 grain |
| 8 x 57J (Norma) | 159 grain |
| | 196 grain |
| 8 x 57JR (Norma) | *196 grain |
| 8 x 57JS (Norma) | *123 grain |
| | 159 grain |
| | 196 grain |
| | *198 grain |
| | 227 grain |
| 8 x 57JRS (Norma) | *196 grain |
| 8 x 57JRS (Speer) | 123 grain |
| | 198 grain |

*Also from Speer-DWM

The 8mm cartridge is rimless; those marked R are rimmed. The letter J designates a smaller-size bullet (.318"); the letter S designates .323"; J and S together indicate a diameter of .323, with the bullet usable in both the smaller and larger bores. The shooter must be careful to match the bullet with the markings on the barrel. The Federal, Remington-Peters, and Winchester-Western cartridges are

loaded lightly because of the danger of being used in poor-quality rifles, so this 170-grain bullet develops slightly more power than the .32 Winchester Special. The Norma loads are more powerful, however, developing power equivalent to the .300 Savage.

.338 Winchester Magnum. A high-powered, flat-trajectory cartridge for all American big game the size of deer and larger. Standard loads are with 200, 250, 300 grain bullets. Trajectory with the 200-grain bullet is similar to the 7mm Remington Magnum and .300 Winchester Magnum, but it is flatter than the .270 Winchester with 150 grains and flatter than .30/06 with 180 grains, and is thus an excellent choice for open-country deer hunting. The 300-grain load is heavy enough to down Alaskan brown bear or grizzlies, or to crash through brush in woods while hunting for elk, moose, or deer.

.340 Weatherby Magnum. Packs more punch and has a flatter trajectory than the .338 Winchester Magnum. Choice of 200, 210, or 250-grain bullets allows use for all American big game the size of deer and up. Recoil is heavy so this caliber should not be selected if the hunter only wants to use it as a deer rifle.

.348 Winchester. A short cartridge designed for use in lever-action rifles, although no guns are made for it today. Only the 200-grain cartridge is available. With the core-lokt bullet, it packs only about half the wallop of the 200-grain .348 Winchester Magnum at 300 yards but about $\frac{3}{4}$ the wallop of the .348 Winchester Magnum when loaded

with the 200-grain silvertip. Still used in Alaska, primarily for deer and moose.

.35 Remington. A fine, but close-range woods rifle for deer and moose, especially with the 200-grain load, which is more destructive than the smaller 150-grain bullet, or the .30 or .32 calibers with which it can be compared.

.350 Remington Magnum. A short magnum for use in standard or short-action rifles. The 200 and 250-grain bullets deliver about 200 more foot-pounds of energy than do the 220-grain .30/06, so this is a fine choice for a medium-size big-game rifle that is big enough, without being so big that it develops excessive recoil.

.351 Winchester, Self-Loading. A very short, fat cartridge loaded only with 180-grain bullets without as much power as the .30/30 Winchester. Only the Winchester '07 autoloader is chambered for it. It is used more by police than as a hunting rifle, since it is good only as a close-range woods rifle (less than 100 yards).

.358 Winchester. Has the same length case as the .308 and is a larger-caliber version of it. The 200-grain bullet gives a similar trajectory to the 200-grain .308 out to 300 yards and delivers a similar punch out to 200 yards. After 200 yards, however, the foot-pounds decline considerably below the .308. The 250-grain bullet makes a powerful deer and moose load for moose hunting, with a punch about equal the 220-grain .30/06.

.358 Norma Magnum. This high-powered big-

game cartridge delivers about 150 more foot-pounds of energy with its 250-grain bullet, and with an even flatter trajectory, than the magnificent .338 Winchester Magnum, so it is useful for all North American big game and is suitable for medium-large African game. It is quite popular in Scandinavian countries as a moose rifle.

.375 H&H Magnum. A "medium"-caliber big-game cartridge used worldwide as an all-around choice for big and dangerous game. It is a safe choice on North American grizzlies or Alaskan brown bear and is useful on many large African species. (It cannot be used on elephant, rhino, or buffalo, since African law requires a .40 caliber.) The most powerful 300-grain load delivers about 300 more foot-pounds of energy, with a flatter trajectory, than does the 300-grain .338 Winchester Magnum. Also available in 270-grain bullets. Delivers a heavy recoil to the shooter.

.378 Weatherby Magnum. Uses the same 270 and 300-grain bullets (not cartridges) as the .375 H&H Magnum but delivers over 1,080–1,250 more foot-pounds of energy at 100 yards, and about 750–840 more foot-pounds at 300 yards, and with a much flatter trajectory than the .375 H&H Magnum. Weatherby advertises this cartridge as "designed for the purpose of killing thick-skinned animals where extremely deep penetration is needed." Thus, this cartridge is adequate for the largest game but cannot be used on elephant, rhino, and buffalo in Africa because of game laws requiring .40 caliber

or over for those species. The recoil is so great that it is too much for many hunters not used to handling truly magnum loads.

.38/40 Winchester. This is an even weaker cartridge than the .38/55, with only 455 foot-pounds of energy at 100 yards with the 180-grain bullet. Even if your deer is standing a foot away, the foot-pounds of energy delivered is only 705. When sighted in at 100 yards, the drop at 200 yards is 26". The only large-caliber cartridges weaker than this are the .32/20 Winchester and the .25/20 Winchester. The principal reason it has killed so many deer is that it makes a large hole and lets out a lot of blood.

.38/55 Winchester. This is a short-range, low-power load for woods hunting for deer or moose. The 255-grain, large-caliber bullet generates 1,130 foot-pounds of energy at 100 yards. When sighted in at 100 yards, the drop at 200 is 22", so don't try any long, open-country shooting with this old-timer.

.401 Winchester Self-Loading. This old-timer is no longer listed as a standard load with any of the major ammunition manufacturers. The original load was a 200-grain bullet with a trajectory about that of the .35 Remington.

.44/40 Winchester. Loaded with a 200-grain bullet, this very short cartridge generates only a fraction more energy than the .38/40 Winchester and will drop a full 31" at 200 yards if sighted in at 100. So don't try to kill anything with it at ranges over 100 yards.

.44 Remington Magnum. This was originally

designed as a powerful revolver cartridge but is now used primarily as a carbine cartridge for short-range woods shooting for deer. Remington still makes a bolt-action rifle for this cartridge also. This cartridge has proved its merit in its 240-grain load, which generates about the same power at 100 yards as the .38/55 Winchester, but not quite as much as the .30/30.

.444 Marlin. The 240-grain bullet with which this cartridge is equipped develops over 3,000 foot-pounds of muzzle energy, but the large caliber slows the bullet so rapidly that it has decreased to 1,815 foot-pounds at 100 yards, about equivalent to the 150-grain .300 Savage or the 175-grain 7mm Mauser. Obviously, this is a short-range cartridge but will down almost all American game at close ranges. It is not a good brush gun or big-game cartridge, however, because the soft-point bullet smashes too easily.

.45/70 Government, 1873 Springfield and 1886 Winchester. This huge cartridge loaded with a 405-grain bullet is an extremely slow-moving, low-powered weapon (developing only 1,210 foot-pounds of energy at 100 yards). But at ranges of 125 yards or less, it tears up a lot of flesh and can be counted on for a quick kill.

.458 Winchester Magnum. This cartridge, loaded with either 500- or 510-grain bullets, ranks next to the .460 Weatherby Magnum as the most powerful U.S. cartridge. It is designed to stop the heaviest game: Alaskan brown bear, Indian tiger,

or African elephant, buffalo, or rhino. The 510-grain steel-point is designed for elephants, the 500-grain soft-point for other game. The recoil is tremendous, however, second only to the .460 Weatherby Magnum.

.460 Weatherby Magnum. The most powerful American cartridge, using the same size bullets as

Remington Centerfire Rifle Cartridges

| Cartridge | Bullet Wt. Grs. Style | | Velocity (fps) | | | |
|----------------------|--------------------------|--------------|----------------|-------------|-------------|-------------|
| | | | Muzzle | 100 yds. | 200 yds. | 300 yds. |
| .17 Remington | 25 | HP | 4020 | 3290 | 2630 | 2060 |
| .218 Bee | 46 | HP | 2860 | 2160 | 1610 | 1200 |
| .22 Hornet | 45 | SP, HP | 2690 | 2030 | 1510 | 1150 |
| .220 Swift | 48 | SP | 4110 | 3490 | 2930 | 2440 |
| .222 Remington | 50 | HPPL | 3200 | 2690 | 2230 | 1830 |
| | 50 | Ptd. SP, MC | 3200 | 2660 | 2170 | 1750 |
| .222 Remington Mag. | 55 | HPPL | 3300 | 2830 | 2400 | 2010 |
| | 55 | Ptd. SP | 3300 | 2800 | 2340 | 1930 |
| .22/250 Remington | 55 | HPPL | 3810 | 3330 | 2890 | 2490 |
| | 55 | Ptd. SP | 3810 | 3270 | 2770 | 2320 |
| .223 Remington | 55 | HPPL | 3300 | 2830 | 2400 | 2010 |
| (5.56mm) | 55 | Ptd. SP | 3300 | 2800 | 2340 | 1930 |
| 6mm Remington | 80 | Ptd. SP, HPL | 3540 | 3130 | 2750 | 2400 |
| 6mm Remington | 100 | Ptd. SPCL | 3190 | 2920 | 2660 | 2420 |
| .243 Winchester | 80 | Ptd. SP | 3500 | 3080 | 2720 | 2410 |
| .243 Winchester | 80 | HPPL | 3500 | 3110 | 2740 | 2410 |
| .243 Winchester | 100 | Ptd. SPCL | 3070 | 2790 | 2540 | 2320 |
| .25/06 Remington | 87 | HPPL | 3500 | 3070 | 2680 | 2310 |
| .25/20 Winchester | 86 | Lead; | 1460 | 1180 | 1030 | 940 |
| .25/20 Winchester | 86 | SP | 1460 | 1180 | 1030 | 940 |
| .25/35 Winchester | 117 | SPCL | 2300 | 1950 | 1680 | 1460 |
| .250 Savage | 100 | Ptd. SP | 2820 | 2500 | 2210 | 1940 |
| 6.5mm Remington Mag. | 120 | Ptd. SPCL | 3030 | 2750 | 2480 | 2230 |

the .458 Winchester Magnum but developing 2,000 more foot-pounds of energy at 100 yards. The trajectory is also flatter than the .458 Winchester, with a midrange trajectory of only 10" at 300 yards. This cartridge should only be used for the largest, most dangerous game like elephant, rhino, and buffalo.

| Energy (ft. lbs.) | | | | Trajectory | | | | | |
|-------------------|----------|----------|----------|---------------------|----------|----------|----------|----------|----------|
| | | | | Rifle Sighted in at | | | | | |
| Muzzle | 100 yds. | 200 yds. | 300 yds. | 50 yds. | 100 yds. | 200 yds. | 100 yds. | 200 yds. | 300 yds. |
| 900 | 600 | 380 | 230 | -0.1 | -2.4 | -9.9 | +1.2 | -6.3 | -21.2 |
| 835 | 475 | 265 | 145 | +0.2 | -6.4 | -25.9 | | | |
| 720 | 410 | 230 | 130 | -0.3 | -7.8 | -30.5 | | | |
| 1800 | 1300 | 915 | 635 | -0.2 | -2.1 | -7.9 | | | |
| 1140 | 800 | 550 | 370 | 0.0 | -4.0 | -15.0 | | | |
| 1140 | 785 | 520 | 340 | 0.0 | -4.0 | -15.7 | | | |
| 1330 | 975 | 700 | 490 | 0.0 | -3.5 | -13.1 | | | |
| 1330 | 955 | 670 | 455 | 0.0 | -3.6 | -13.8 | | | |
| 1770 | 1360 | 1020 | 760 | | | | +1.1 | -5.3 | -16.3 |
| 1770 | 1300 | 935 | 655 | | | | -1.2 | -5.8 | -18.1 |
| 1330 | 975 | 700 | 490 | 0.0 | -3.5 | -13.1 | | | |
| 1330 | 955 | 670 | 455 | 0.0 | -3.6 | -13.8 | | | |
| 2220 | 1740 | 1340 | 1018 | | | | +1.3 | -6.0 | -18.0 |
| 2260 | 1890 | 1570 | 1300 | | | | +1.6 | -6.5 | -18.9 |
| 2180 | 1690 | 1320 | 1030 | -0.1 | -2.8 | -10.2 | | | |
| 2180 | 1720 | 1340 | 1030 | -0.1 | -2.7 | -10.0 | | | |
| 2090 | 1730 | 1430 | 1190 | 0.0 | -3.5 | -12.2 | | | |
| 2370 | 1820 | 1390 | 1030 | | | | +1.4 | -6.3 | -19.2 |
| 405 | 265 | 300 | 170 | +2.1 | -23.9 | -79.4 | | | |
| 405 | 265 | 300 | 170 | +2.1 | -23.9 | -79.4 | | | |
| 1370 | 985 | 730 | 555 | +0.5 | -8.2 | -28.6 | | | |
| 1760 | 1390 | 1080 | 835 | +0.1 | -4.8 | -16.5 | | | |
| 2450 | 2010 | 1640 | 1330 | | | | +1.8 | -7.5 | -22.0 |

Remington Centerfire Rifle Cartridges (Cont.)

| Cartridge | Bullet Wt. Grs. Style | | Velocity (fps) | | | |
|----------------------|--------------------------|------------|----------------|----------|----------|----------|
| | | | Muzzle | 100 yds. | 200 yds. | 300 yds. |
| .257 Roberts | 117 | SP, CL | 2650 | 2280 | 1950 | 1690 |
| .264 Winchester Mag. | 100 | Ptd. SPCL | 3700 | 3260 | 2880 | 2550 |
| .264 Winchester Mag. | 140 | Ptd. SPCL | 3200 | 2940 | 2700 | 2480 |
| .270 Winchester | 100 | Ptd. SP | 3480 | 3070 | 2690 | 2340 |
| .270 Winchester | 150 | SPCL | 2800 | 2440 | 2140 | 1870 |
| .270 Winchester | 130 | Ptd. SPCL | 3140 | 2850 | 2580 | 2320 |
| .270 Winchester | 130 | BP | 3140 | 2880 | 2630 | 2400 |
| .280 Remington | 150 | Ptd. SPCL | 2900 | 2670 | 2450 | 2220 |
| .280 Remington | 165 | SPCL | 2820 | 2510 | 2220 | 1970 |
| 7mm Remington Mag. | 125 | Ptd. SPCL | 3430 | 3080 | 2750 | 2450 |
| 7mm Remington Mag. | 150 | Ptd. SPCL | 3260 | 2970 | 2700 | 2450 |
| 7mm Remington Mag. | 175 | Ptd. SPCL | 3070 | 2850 | 2630 | 2430 |
| 7mm Mauser | 175 | SP | 2490 | 2170 | 1900 | 1680 |
| .30 Carbine | 110 | SP | 1980 | 1540 | 1230 | 1040 |
| .30/30 Winchester | 170 | SPCL | 2220 | 1890 | 1630 | 1410 |
| .30/30 Winchester | 170 | HPCL, SPCL | 2220 | 1890 | 1630 | 1410 |
| .30/30 Winchester | 150 | SPCL | 2410 | 1960 | 1620 | 1360 |
| .30 Remington | 170 | SPCL | 2120 | 1820 | 1560 | 1350 |
| .30/40 Krag | 180 | SPCL | 2470 | 2120 | 1830 | 1590 |
| .30/40 Krag | 180 | Ptd. SPCL | 2470 | 2250 | 2040 | 1850 |
| .30/06 Springfield | 220 | SPCL | 2410 | 2120 | 1870 | 1670 |
| .30/06 Springfield | 150 | Ptd. SPCL | 2970 | 2670 | 2400 | 2130 |
| .30/06 Springfield | 150 | BP | 2970 | 2710 | 2470 | 2240 |
| .30/06 Springfield | 180 | BP | 2700 | 2480 | 2280 | 2080 |
| .30/06 Springfield | 125 | Ptd. SP | 3200 | 2810 | 2480 | 2200 |
| .30/06 Springfield | 180 | SPCL | 2700 | 2330 | 2010 | 1740 |
| .30/06 Springfield | 180 | Ptd. SPCL | 2700 | 2470 | 2250 | 2040 |
| .300 Savage | 180 | SPCL | 2370 | 2040 | 1760 | 1520 |
| .300 Savage | 180 | Ptd. SPCL | 2370 | 2160 | 1960 | 1770 |
| .300 Savage | 150 | SPCL | 2670 | 2270 | 1930 | 1660 |
| .300 Savage | 150 | Ptd. SPCL | 2670 | 2390 | 2130 | 1890 |
| .300 H&H Mag. | 180 | Ptd. SPCL | 2920 | 2670 | 2440 | 2220 |
| .300 Winchester Mag. | 150 | Ptd. SPCL | 3400 | 3050 | 2730 | 2430 |
| .300 Winchester Mag. | 180 | Ptd. SPCL | 3070 | 2850 | 2640 | 2440 |
| .303 British | 215 | SP | 2980 | 1900 | 1660 | 1460 |
| .303 British | 180 | SP, CL | 2540 | 2300 | 2090 | 1900 |
| .308 Winchester | 110 | Ptd. SP | 3340 | 2810 | 2340 | 1920 |

| Energy (ft. lbs.) | | | | Trajectory | | | | | |
|-------------------|----------|----------|----------|---------------------|----------|----------|----------|----------|----------|
| | | | | Rifle Sighted in at | | | | | |
| | | | | 100 yds. | | | 200 yds. | | |
| Muzzle | 100 yds. | 200 yds. | 300 yds. | 50 yds. | 200 yds. | 300 yds. | 100 yds. | 300 yds. | 400 yds. |
| 1820 | 1350 | 985 | 740 | +0.2 | — 5.7 | —20.6 | | | |
| 3040 | 2360 | 1840 | 1440 | | | | +1.1 | — 5.5 | —15.6 |
| 3180 | 2690 | 2270 | 1910 | | | | +1.5 | — 6.1 | —18.4 |
| 2690 | 2090 | 1600 | 1215 | | | | +1.3 | — 6.3 | —18.5 |
| 2610 | 1980 | 1520 | 1160 | | | | +2.4 | — 9.5 | —29.6 |
| 2840 | 2340 | 1920 | 1550 | | | | +1.6 | — 7.0 | —20.1 |
| 2840 | 2390 | 1990 | 1660 | | | | +1.6 | — 6.5 | —19.6 |
| 2800 | 2370 | 2000 | 1640 | | | | +2.0 | — 8.1 | —23.0 |
| 2910 | 2310 | 1810 | 1420 | | | | +2.3 | — 9.3 | —27.6 |
| 3260 | 2630 | 2100 | 1660 | | | | +1.1 | — 5.7 | —17.2 |
| 3540 | 2940 | 2430 | 1990 | | | | +1.5 | — 6.3 | —18.4 |
| 3660 | 3150 | 2700 | 2290 | | | | +1.7 | — 6.7 | —19.3 |
| 2410 | 1830 | 1400 | 1100 | +0.3 | — 6.4 | —22.4 | | | |
| 955 | 575 | 370 | 260 | +1.0 | —14.1 | —51.8 | | | |
| 1860 | 1350 | 1000 | 750 | +0.7 | — 8.2 | —29.6 | | | |
| 1860 | 1350 | 1000 | 750 | +0.7 | — 8.2 | —29.6 | | | |
| 1930 | 1280 | 875 | 615 | +0.4 | — 8.3 | —29.5 | | | |
| 1700 | 1250 | 920 | 690 | +0.6 | — 9.5 | —33.8 | | | |
| 2440 | 1790 | 1340 | 1010 | +0.3 | — 6.4 | —23.4 | | | |
| 2440 | 2020 | 1660 | 1370 | +0.3 | — 6.1 | —20.2 | | | |
| 2830 | 1290 | 1710 | 1360 | +0.3 | — 6.7 | —23.6 | | | |
| 2930 | 2370 | 1920 | 1510 | | | | +1.9 | — 7.5 | —22.6 |
| 2930 | 2440 | 2030 | 1670 | | | | +1.9 | — 7.5 | —22.6 |
| 2910 | 2460 | 2080 | 1730 | | | | +2.4 | — 8.5 | —25.6 |
| 2840 | 2190 | 1710 | 1340 | | | | +1.6 | — 7.4 | —21.4 |
| 2910 | 2170 | 1610 | 1210 | +0.2 | — 5.6 | —19.2 | | | |
| 2910 | 2440 | 2020 | 1660 | | | | +2.4 | — 9.0 | —27.1 |
| 2240 | 1660 | 1240 | 920 | +0.4 | — 7.5 | —25.3 | | | |
| 2240 | 1860 | 1530 | 1250 | +0.4 | — 6.5 | —22.3 | | | |
| 2370 | 1710 | 1240 | 915 | +0.2 | — 5.9 | —20.4 | | | |
| 2370 | 1900 | 1510 | 1190 | +0.2 | — 5.4 | —17.9 | | | |
| 3400 | 2850 | 2380 | 1970 | | | | +1.9 | — 7.6 | —22.5 |
| 3850 | 3100 | 2480 | 1970 | | | | +1.5 | — 6.1 | —18.1 |
| 3770 | 3250 | 2790 | 2380 | | | | +1.7 | — 6.9 | —19.4 |
| 2270 | 1720 | 1310 | 1020 | +0.6 | — 9.1 | —30.2 | | | |
| 2580 | 2120 | 1750 | 1440 | +0.2 | — 5.8 | —19.0 | | | |
| 2730 | 1930 | 1340 | 900 | +0.0 | — 3.7 | —13.6 | | | |

Remington Centerfire Rifle Cartridges (Cont.)

| Cartridge | Bullet Wt. Grs. Style | | Velocity (fps) | | | |
|-----------------------|--------------------------|-------------|----------------|----------|----------|----------|
| | | | Muzzle | 100 yds. | 200 yds. | 300 yds. |
| .308 Winchester | 150 | Ptd. SP, CL | 2860 | 2570 | 2300 | 2050 |
| .308 Winchester | 180 | Ptd. SP, CL | 2610 | 2390 | 2170 | 1970 |
| .308 Winchester | 180 | SP, CL | 2610 | 2250 | 1940 | 1680 |
| 8mm Mauser | 170 | SP, CL | 2570 | 2140 | 1790 | 1520 |
| .32 Remington | 170 | SP, CL | 2120 | 1800 | 1540 | 1340 |
| .32 Winchester Spcl. | 170 | HPCL, SP | 2280 | 1920 | 1630 | 1410 |
| .32 Winchester Spcl. | 170 | SP, CL | 2280 | 1920 | 1630 | 1410 |
| .32/20 Winchester | 100 | Lead; SP | 1290 | 1060 | 940 | 840 |
| .348 Winchester | 200 | SP, CL | 2530 | 2140 | 1820 | 1570 |
| .35 Remington | 150 | Ptd. SP, CL | 2400 | 1960 | 1580 | 1280 |
| .35 Remington | 200 | SP, CL | 2100 | 1710 | 1390 | 1160 |
| .350 Remington Mag. | 200 | Ptd. SP, CL | 2710 | 2410 | 2130 | 1870 |
| .350 Remington Mag. | 250 | Ptd. SP, CL | 2410 | 2190 | 1980 | 1790 |
| .351 Winchester S. L. | 180 | SP | 1850 | 1560 | 1310 | 1140 |
| .375 H&H Mag. | 270 | SP | 2704 | 2460 | 2210 | 1990 |
| .375 H&H Mag. | 300 | MC | 2550 | 2180 | 1860 | 1590 |
| .38/40 Winchester | 180 | SP | 1330 | 1070 | 960 | 850 |
| .444 Marlin | 240 | SP | 2400 | 1845 | 1410 | 1125 |
| .44/40 Winchester | 200 | SP | 1310 | 1050 | 940 | 830 |
| .44 Remington Mag. | 240 | SP | 1750 | 1360 | 1110 | 980 |
| .45/70 Gov't. | 405 | SP | 1320 | 1160 | 1050 | 990 |
| .458 Winchester Mag. | 510 | SP | 2130 | 1840 | 1600 | 1400 |
| .458 Winchester Mag. | 500 | MC | 2130 | 1910 | 1700 | 1520 |

Ballistics figures established in test barrels in accordance with standards set by Sporting Arms and Ammunition Manufacturers' Institute.

Abbreviations: HP—Hollow Point SP—Soft Point BP—Bronze Point CL—

| Energy (ft. lbs.) | | | | Trajectory | | | | | |
|-------------------|----------|----------|----------|---------------------|----------|----------|----------|----------|----------|
| | | | | Rifle Sighted in at | | | | | |
| | | | | 100 yds. | | | 200 yds. | | |
| Muzzle | 100 yds. | 200 yds. | 300 yds. | 50 yds. | 200 yds. | 300 yds. | 100 yds. | 300 yds. | 400 yds. |
| 2730 | 2200 | 1760 | 1400 | | | | +2.1 | - 8.5 | -25.6 |
| 2720 | 2280 | 1870 | 1540 | +0.3 | - 5.0 | -17.8 | | | |
| 2720 | 2020 | 1500 | 1130 | +0.2 | - 6.0 | -20.8 | | | |
| 2490 | 1730 | 1210 | 870 | +0.3 | - 6.6 | -24.7 | | | |
| 1700 | 1220 | 895 | 680 | +0.6 | - 9.5 | -33.3 | | | |
| 1960 | 1390 | 1000 | 750 | +0.5 | - 8.5 | -29.8 | | | |
| 1960 | 1390 | 1000 | 750 | +0.5 | - 8.5 | -29.8 | | | |
| 370 | 250 | 195 | 155 | +2.8 | -30.1 | -97.2 | | | |
| 2840 | 2330 | 1470 | 1090 | +0.3 | - 7.1 | -23.7 | | | |
| 1920 | 1280 | 835 | 545 | +0.4 | - 8.1 | -30.7 | | | |
| 1950 | 1300 | 855 | 605 | +0.7 | -10.9 | -39.4 | | | |
| 3260 | 2570 | 2000 | 1550 | +0.2 | - 5.1 | -18.0 | | | |
| 3220 | 2660 | 2180 | 1780 | +0.4 | - 6.4 | -21.5 | | | |
| 1370 | 975 | 685 | 520 | +1.0 | -14.5 | -51.8 | | | |
| 4500 | 3620 | 2920 | 2370 | | | | +2.4 | - 9.8 | -27.6 |
| 4330 | 3160 | 2300 | 1680 | | | | +3.1 | -12.5 | -37.6 |
| 705 | 455 | 370 | 290 | +2.7 | -29.1 | -93.7 | | | |
| 3070 | 1815 | 1060 | 675 | +0.6 | - 9.6 | -36.7 | | | |
| 760 | 490 | 390 | 305 | +2.8 | -29.6 | -95.2 | | | |
| 1630 | 985 | 655 | 510 | +1.4 | -17.5 | -64.5 | | | |
| 1570 | 1210 | 990 | 880 | +2.4 | -25.1 | -81.2 | | | |
| 5140 | 3830 | 2900 | 2220 | +0.6 | - 9.2 | -32.1 | | | |
| 5040 | 4050 | 3210 | 2570 | +0.6 | - 8.9 | -29.4 | | | |

Core-Lokt MC—Metal Case HPCL—Hollow Point Core-Lokt Ptd. SP—Pointed Soft Point TH—Tapered Heel PL—Power Lokt Inches above (+) or below (-) line of sight. Hold low for (+) figures, high for (-) figures.

Centerfire Rifle Cartridges

Winchester-Western, Remington-Peters, Federal and Speer-DWM

Most of these centerfire loads are available from Winchester-Western and Remington-Peters. Loads available from only one source are marked by a letter, thus: Winchester (a); Western (b); Remington (c); Peters (d);

| Cartridge | Bullet | |
|-----------------------------|----------|--------------|
| | Wt. Grs. | Type |
| 17 Remington | 25 | HP, PL |
| 218 Bee* | 46 | HP |
| 22 Hornet* | 45 | SP |
| 22 Hornet* (c, d) | 45 | HP |
| 22 Hornet* | 46 | HP |
| 222 Remington (e) | 50 | PSP, MC, PL† |
| 222 Remington Magnum (c, d) | 55 | SP, PL† |
| 222 Remington Magnum (c, d) | 55 | HP, PL |
| 223 Remington (c, d, e) | 55 | SP, PL† |
| 22-250 Remington | 55 | PSP |
| 22-250 Remington (c, d) | 55 | HP, PL |
| 225 Winchester (a, b) | 55 | PSP |
| 243 Winchester (e) | 80 | PSP, PL† |
| 243 Winchester (c, d) | 80 | HP, PL |
| 243 Winchester (e) | 100 | PP, CL, PSP |
| 6mm Remington (c, d) | 80 | PSP, HP, PL† |
| 6mm Remington (c, d) | 100 | PCL |
| 244 Remington (c, d) | 90 | PSP |
| 25-06 Remington (c, d) | 87 | HP |
| 25-06 Remington (c, d) | 120 | PSP, CL |
| 25-20 Winchester* | 86 | L, Lu |
| 25-20 Winchester* | 86 | SP |
| 25-35 Winchester | 117 | SP, CL |
| 250 Savage (a, b) | 87 | PSP, SP |
| 250 Savage | 100 | ST, CL, PSP |
| 256 Winchester Magnum* (b) | 60 | OPE |
| 257 Roberts (a, b) | 87 | PSP |
| 257 Roberts (a, b) | 100 | ST, CL |
| 257 Roberts | 117 | PP, CL |
| 6.5mm Remington Magnum (c) | 100 | PSPCL |
| 6.5mm Remington Magnum (c) | 120 | PSPCL |
| 264 Winchester Magnum | 100 | PSP, CL |
| 264 Winchester Magnum | 140 | PP, CL |

Speer-DWM (f). Those fewer cartridges also available from Federal are marked (e). Contrary to previous practice, W-W and R-P prices are not necessarily uniform, hence prices are approximate.

| Velocity (fps) | | | | Energy (ft. lbs.) | | | | Mid-Range Trajectory | | |
|----------------|----------|----------|----------|-------------------|----------|----------|----------|----------------------|----------|----------|
| Muzzle | 100 yds. | 200 yds. | 300 yds. | Muzzle | 100 yds. | 200 yds. | 300 yds. | 100 yds. | 200 yds. | 300 yds. |
| 4020 | 3290 | 2630 | 2060 | 900 | 600 | 380 | 230 | Not Available | | |
| 2860 | 2160 | 1610 | 1200 | 835 | 475 | 265 | 145 | 0.7 | 3.8 | 11.5 |
| 2690 | 2030 | 1510 | 1150 | 720 | 410 | 230 | 130 | 0.8 | 4.3 | 13.0 |
| 2690 | 2030 | 1510 | 1150 | 720 | 410 | 230 | 130 | 0.8 | 4.3 | 13.0 |
| 2690 | 2030 | 1510 | 1150 | 740 | 420 | 235 | 135 | 0.8 | 4.3 | 13.0 |
| 3200 | 2660 | 2170 | 1750 | 1140 | 785 | 520 | 340 | 0.5 | 2.5 | 7.0 |
| 3300 | 2800 | 2340 | 1930 | 1330 | 955 | 670 | 455 | 0.5 | 2.3 | 6.1 |
| 3300 | 2830 | 2400 | 2010 | 1330 | 975 | 700 | 490 | Not Available | | |
| 3300 | 2800 | 2340 | 1930 | 1330 | 955 | 670 | 455 | 0.5 | 2.1 | 5.4 |
| 3810 | 3270 | 2770 | 2320 | 1770 | 1300 | 935 | 655 | 0.3 | 1.6 | 4.4 |
| 3810 | 3330 | 2890 | 2490 | 1770 | 1360 | 1020 | 760 | Not Available | | |
| 3650 | 3140 | 2680 | 2270 | 1630 | 1200 | 875 | 630 | 0.4 | 1.8 | 4.8 |
| 3500 | 3080 | 2720 | 2410 | 2180 | 1690 | 1320 | 1030 | 0.4 | 1.8 | 4.7 |
| 3450 | 3050 | 2675 | 2330 | 2115 | 1650 | 1270 | 965 | Not Available | | |
| 3070 | 2790 | 2540 | 2320 | 2090 | 1730 | 1430 | 1190 | 0.5 | 2.2 | 5.5 |
| 3450 | 3130 | 2750 | 2400 | 2220 | 1740 | 1340 | 1018 | 0.4 | 1.8 | 4.7 |
| 3190 | 2920 | 2660 | 2420 | 2260 | 1890 | 1570 | 1300 | 0.5 | 2.1 | 5.1 |
| 3200 | 2850 | 2530 | 2230 | 2050 | 1630 | 1280 | 995 | 0.5 | 2.1 | 5.5 |
| 3500 | 3070 | 2680 | 2310 | 2370 | 1820 | 1390 | 1030 | Not Available | | |
| 3120 | 2850 | 2600 | 2360 | 2590 | 2160 | 1800 | 1480 | Not Available | | |
| 1460 | 1180 | 1030 | 940 | 405 | 265 | 200 | 170 | 2.6 | 12.5 | 32.0 |
| 1460 | 1180 | 1030 | 940 | 405 | 265 | 200 | 170 | 2.6 | 12.5 | 32.0 |
| 2300 | 1910 | 1600 | 1340 | 1370 | 945 | 665 | 465 | 1.0 | 4.6 | 12.5 |
| 3030 | 2660 | 2330 | 2060 | 1770 | 1370 | 1050 | 820 | 0.6 | 2.5 | 6.4 |
| 2820 | 2460 | 2140 | 1870 | 1760 | 1340 | 1020 | 775 | 0.6 | 2.9 | 7.4 |
| 2800 | 2070 | 1570 | 1220 | 1040 | 570 | 330 | 200 | 0.8 | 4.0 | 12.0 |
| 3200 | 2840 | 2500 | 2190 | 1980 | 1560 | 1210 | 925 | 0.5 | 2.2 | 5.7 |
| 2900 | 2540 | 2210 | 1920 | 1870 | 1430 | 1080 | 820 | 0.6 | 2.7 | 7.0 |
| 2650 | 2280 | 1950 | 1690 | 1820 | 1350 | 985 | 740 | 0.7 | 3.4 | 8.8 |
| 3450 | 3070 | 2690 | 2320 | 2640 | 2090 | 1610 | 1190 | Not Available | | |
| 3030 | 2750 | 2480 | 2230 | 2450 | 2010 | 1640 | 1330 | 0.5 | 2.3 | 5.7 |
| 3700 | 3260 | 2880 | 2550 | 3040 | 2360 | 1840 | 1440 | 0.4 | 1.6 | 4.2 |
| 3200 | 2490 | 2700 | 2480 | 3180 | 2690 | 2270 | 1910 | 0.5 | 2.0 | 4.9 |

Centerfire Rifle Cartridges (Cont.)

| Cartridge | Bullet | |
|------------------------------|----------|--------------------|
| | Wt. Grs. | Type |
| 270 Winchester | 100 | PSP |
| 270 Winchester (e) | 130 | PP, PSP |
| 270 Winchester | 130 | ST, CL, BP, PP |
| 270 Winchester (c, d) | 150 | CL |
| 270 Winchester (a, b, e) | 150 | PP |
| 280 Remington (c, d) | 150 | PCL |
| 280 Remington (c, d) | 165 | CL |
| 284 Winchester (a, b) | 125 | PP |
| 284 Winchester (a, b) | 150 | PP |
| 7mm Mauser (e) | 139 | SP |
| 7mm Mauser (e) | 175 | SP |
| 7mm Remington Magnum | 125 | CL |
| 7mm Remington Magnum (e) | 150 | PP, CL |
| 7mm Remington Magnum (e) | 175 | PP |
| 7mm Remington Magnum (c, d) | 175 | PCL |
| 30 Carbine* (e) | 110 | HSP, SP |
| 30-30 Winchester (c, d) | 150 | CL |
| 30-30 Winchester (e) | 150 | HP |
| 30-30 Winchester (a, b) | 150 | PP, ST, OPE |
| 30-30 Winchester (e) | 170 | PP, HP, CL, ST, MC |
| 30 Remington | 170 | ST, CL |
| 30-06 Springfield (a, b) | 110 | PSP |
| 30-06 Springfield | 125 | PSP |
| 30-06 Springfield (c, d) | 150 | BP |
| 30-06 Springfield (e) | 150 | PP |
| 30-06 Springfield | 150 | ST, PCL, PSP |
| 30-06 Springfield | 180 | PP, CL, PSP |
| 30-06 Springfield (e) | 180 | ST, BP, PCL |
| 30-06 Springfield | 180 | MCBT, MAT |
| 30-06 Springfield | 220 | PP, CL |
| 30-06 Springfield (a, b) | 220 | ST |
| 30-40 Krag | 180 | PP, CL |
| 30-40 Krag | 180 | ST, PCL |
| 30-40 Krag (a, b) | 220 | ST |
| 300 Winchester Magnum (e) | 150 | PP, PCL |
| 300 Winchester Magnum (e) | 180 | PP, PCL |
| 300 Winchester Magnum (a, b) | 220 | ST |
| 300 H&H Magnum (a, b) | 150 | ST |

| Velocity (fps) | | | | Energy (ft. lbs.) | | | | Mid-Range Trajectory | | |
|----------------|----------|----------|----------|-------------------|----------|----------|----------|----------------------|----------|----------|
| Muzzle | 100 yds. | 200 yds. | 300 yds. | Muzzle | 100 yds. | 200 yds. | 300 yds. | 100 yds. | 200 yds. | 300 yds. |
| 3480 | 3070 | 2690 | 2340 | 2690 | 2090 | 1600 | 1215 | 0.4 | 1.8 | 4.8 |
| 3140 | 2880 | 2630 | 2400 | 2850 | 2390 | 2000 | 1660 | 0.5 | 2.1 | 5.3 |
| 3140 | 2850 | 2580 | 2320 | 2840 | 2340 | 1920 | 1550 | 0.5 | 2.1 | 5.3 |
| 2800 | 2440 | 2140 | 1870 | 2610 | 1980 | 1520 | 1160 | 0.6 | 2.9 | 7.6 |
| 2900 | 2620 | 2380 | 2160 | 2800 | 2290 | 1890 | 1550 | 0.6 | 2.5 | 6.3 |
| 2900 | 2670 | 2450 | 2220 | 2800 | 2370 | 2000 | 1640 | 0.6 | 2.5 | 6.1 |
| 2820 | 2510 | 2220 | 1970 | 2910 | 2310 | 1810 | 1420 | 0.6 | 2.8 | 7.2 |
| 3200 | 2880 | 2590 | 2310 | 2840 | 2300 | 1860 | 1480 | 0.5 | 2.1 | 5.3 |
| 2900 | 2630 | 2380 | 2160 | 2800 | 2300 | 1890 | 1550 | 0.6 | 2.5 | 6.3 |
| 2710 | 2440 | 2190 | 1960 | 2280 | 1850 | 1490 | 1190 | 0.7 | 3.0 | 7.8 |
| 2490 | 2170 | 1900 | 1680 | 2410 | 1830 | 1400 | 1100 | 0.8 | 3.7 | 9.5 |
| 3430 | 3080 | 2750 | 2450 | 3260 | 2630 | 2100 | 1660 | 0.6 | 1.8 | 4.7 |
| 3260 | 2970 | 2700 | 2450 | 3540 | 2940 | 2430 | 1990 | 0.4 | 2.0 | 4.9 |
| 3070 | 2720 | 2400 | 2120 | 3660 | 2870 | 2240 | 1750 | 0.5 | 2.4 | 6.1 |
| 3070 | 2860 | 2660 | 2460 | 3660 | 3170 | 2740 | 2350 | 0.5 | 2.1 | 5.2 |
| 1980 | 1540 | 1230 | 1040 | 950 | 575 | 370 | 260 | 1.4 | 7.5 | 21.7 |
| 2410 | 1960 | 1620 | 1360 | 1930 | 1280 | 875 | 616 | 0.9 | 4.5 | 12.5 |
| 2410 | 2020 | 1700 | 1430 | 1930 | 1360 | 960 | 680 | 0.9 | 4.2 | 11.0 |
| 2410 | 2020 | 1700 | 1430 | 1930 | 1360 | 960 | 680 | 0.9 | 4.2 | 11.0 |
| 2220 | 1890 | 1630 | 1410 | 1860 | 1350 | 1000 | 750 | 1.2 | 4.6 | 12.5 |
| 2120 | 1820 | 1560 | 1350 | 1700 | 1250 | 920 | 690 | 1.1 | 5.3 | 14.0 |
| 3370 | 2830 | 2350 | 1920 | 2770 | 1960 | 1350 | 900 | 0.5 | 2.2 | 6.0 |
| 3200 | 2810 | 2480 | 2200 | 2840 | 2190 | 1710 | 1340 | 0.5 | 2.2 | 5.6 |
| 2970 | 2710 | 2470 | 2240 | 2930 | 2440 | 2030 | 1670 | 0.5 | 2.4 | 6.0 |
| 2970 | 2620 | 2300 | 2010 | 2930 | 2280 | 1760 | 1340 | 0.6 | 2.5 | 6.5 |
| 2970 | 2670 | 2400 | 2130 | 2930 | 2370 | 1920 | 1510 | 0.6 | 2.4 | 6.1 |
| 2700 | 2330 | 2010 | 1740 | 2910 | 2170 | 1610 | 1210 | 0.7 | 3.1 | 8.3 |
| 2700 | 2470 | 2250 | 2040 | 2910 | 2440 | 2020 | 1660 | 0.7 | 2.9 | 7.0 |
| 2700 | 2520 | 2350 | 2190 | 2910 | 2540 | 2200 | 1900 | 0.6 | 2.8 | 6.7 |
| 2410 | 2120 | 1870 | 1670 | 2830 | 2190 | 1710 | 1360 | 0.8 | 3.9 | 9.8 |
| 2410 | 2180 | 1980 | 1790 | 2830 | 2320 | 1910 | 1560 | 0.8 | 3.7 | 9.2 |
| 2470 | 2120 | 1830 | 1590 | 2440 | 1790 | 1340 | 1010 | 0.8 | 3.8 | 9.9 |
| 2470 | 2250 | 2040 | 1850 | 2440 | 2020 | 1660 | 1370 | 0.8 | 3.5 | 8.5 |
| 2200 | 1990 | 1800 | 1630 | 2360 | 1930 | 1580 | 1300 | 1.0 | 4.4 | 11.0 |
| 3400 | 3050 | 2730 | 2430 | 3850 | 3100 | 2480 | 1970 | 0.4 | 1.9 | 4.8 |
| 3070 | 2850 | 2640 | 2440 | 3770 | 3250 | 2790 | 2380 | 0.5 | 2.1 | 5.3 |
| 2720 | 2490 | 2270 | 2060 | 3620 | 3030 | 2520 | 2070 | 0.6 | 2.9 | 6.9 |
| 3190 | 2870 | 2580 | 2300 | 3390 | 2740 | 2220 | 1760 | 0.5 | 2.1 | 5.2 |

Centerfire Rifle Cartridges (Cont.)

| Cartridge | Bullet | |
|---------------------------------|----------|------------|
| | Wt. Grs. | Type |
| 300 H&H Magnum | 180 | ST, PCL |
| 300 H&H Magnum (a, b) | 220 | ST, CL |
| 300 Savage (e) | 150 | PP |
| 300 Savage | 150 | ST, PCL |
| 300 Savage (c, d) | 150 | CL |
| 300 Savage (e) | 180 | PP, CL |
| 300 Savage | 180 | ST, PCL |
| 303 Savage (c, d) | 180 | CL |
| 303 Savage (a, b) | 190 | ST |
| 303 British (e) | 180 | PP, CL |
| 303 British (c, d) | 215 | SP |
| 308 Winchester (a, b) | 110 | PSP |
| 308 Winchester (a, b) | 125 | PSP |
| 308 Winchester (e) | 150 | PP |
| 308 Winchester | 150 | ST, PCL |
| 308 Winchester (e) | 180 | PP, CL |
| 308 Winchester | 180 | ST, PCL |
| 308 Winchester (a, b) | 200 | ST |
| 32 Winchester Special (c, d, e) | 170 | HP, CL |
| 32 Winchester Special | 170 | PP, ST |
| 32 Remington (c, d) | 170 | CL |
| 32 Remington (a, b) | 170 | ST |
| 32-20 Winchester* | 100 | SP |
| 32-20 Winchester* | 100 | SP, L, Lu |
| 8mm Mauser (e) | 170 | PP, CL |
| 338 Winchester Magnum (a, b) | 200 | PP |
| 338 Winchester Magnum (a, b) | 250 | ST |
| 338 Winchester Magnum (a, b) | 300 | PP |
| 348 Winchester (a) | 200 | ST |
| 348 Winchester (c, d) | 200 | CL |
| 35 Remington (c, d) | 150 | CL |
| 35 Remington (e) | 200 | PP, ST, CL |
| 350 Remington Magnum (c, d) | 200 | PCL |
| 350 Remington Magnum (c, d) | 250 | PCL |
| 351 Winchester Self-Loading* | 180 | SP |
| 358 Winchester (a, b) | 200 | ST |
| 358 Winchester (a, b) | 250 | ST |
| 375 H&H Magnum | 270 | PP, SP |

| Velocity (fps) | | | | Energy (ft. lbs.) | | | | Mid-Range Trajectory | | |
|----------------|------|------|------|-------------------|------|------|------|----------------------|------|------|
| | 100 | 200 | 300 | | 100 | 200 | 300 | 100 | 200 | 300 |
| Muzzle | yds. | yds. | yds. | Muzzle | yds. | yds. | yds. | yds. | yds. | yds. |
| 2920 | 2670 | 2440 | 2220 | 3400 | 2850 | 2380 | 1970 | 0.6 | 2.4 | 5.8 |
| 2620 | 2370 | 2150 | 1940 | 3350 | 2740 | 2260 | 1840 | 0.7 | 3.1 | 7.7 |
| 2670 | 2350 | 2060 | 1800 | 2370 | 1840 | 1410 | 1080 | 0.7 | 3.2 | 8.0 |
| 2670 | 2390 | 2130 | 1890 | 2370 | 1900 | 1510 | 1190 | 0.7 | 3.0 | 7.6 |
| 2670 | 2270 | 1930 | 1660 | 2370 | 1710 | 1240 | 916 | 0.7 | 3.3 | 9.3 |
| 2370 | 2040 | 1760 | 1520 | 2240 | 1660 | 1240 | 920 | 0.9 | 4.1 | 10.5 |
| 2370 | 2160 | 1960 | 1770 | 2240 | 1860 | 1530 | 1250 | 0.9 | 3.7 | 9.2 |
| 2140 | 1810 | 1550 | 1340 | 1830 | 1310 | 960 | 715 | 1.1 | 5.4 | 14.0 |
| 1980 | 1680 | 1440 | 1250 | 1650 | 1190 | 875 | 660 | 1.3 | 6.2 | 15.5 |
| 2540 | 2300 | 2090 | 1900 | 2580 | 2120 | 1750 | 1440 | 0.7 | 3.3 | 8.2 |
| 2180 | 1900 | 1660 | 1460 | 2270 | 1720 | 1310 | 1020 | 1.1 | 4.9 | 12.5 |
| 3340 | 2810 | 2340 | 1920 | 2730 | 1930 | 1340 | 900 | 0.5 | 2.2 | 6.0 |
| 3100 | 2740 | 2430 | 2160 | 2670 | 2080 | 1640 | 1300 | 0.5 | 2.3 | 5.9 |
| 2860 | 2520 | 2210 | 1930 | 2730 | 2120 | 1630 | 1240 | 0.6 | 2.7 | 7.0 |
| 2860 | 2570 | 2300 | 2050 | 2730 | 2200 | 1760 | 1400 | 0.6 | 2.6 | 6.5 |
| 2610 | 2250 | 1940 | 1680 | 2720 | 2020 | 1500 | 1130 | 0.7 | 3.4 | 8.9 |
| 2610 | 2390 | 2170 | 1970 | 2720 | 2280 | 1870 | 1540 | 0.8 | 3.1 | 7.4 |
| 2450 | 2210 | 1980 | 1770 | 2670 | 2170 | 1750 | 1400 | 0.8 | 3.6 | 9.0 |
| 2280 | 1920 | 1630 | 1410 | 1960 | 1390 | 1000 | 750 | 1.0 | 4.8 | 12.5 |
| 2280 | 1870 | 1560 | 1330 | 1960 | 1320 | 920 | 665 | 1.0 | 4.8 | 13.0 |
| 2120 | 1800 | 1540 | 1340 | 1700 | 1220 | 895 | 680 | 1.0 | 4.9 | 13.0 |
| 2120 | 1760 | 1460 | 1220 | 1700 | 1170 | 805 | 560 | 1.1 | 5.3 | 14.5 |
| 1290 | 1060 | 940 | 840 | 370 | 250 | 195 | 155 | 3.3 | 15.5 | 38.0 |
| 1290 | 1060 | 940 | 840 | 370 | 250 | 195 | 155 | 3.3 | 15.5 | 38.0 |
| 2570 | 2140 | 1790 | 1520 | 2490 | 1730 | 1210 | 870 | 0.8 | 3.9 | 10.5 |
| 3000 | 2690 | 2410 | 2170 | 4000 | 3210 | 2580 | 2090 | 0.5 | 2.4 | 6.0 |
| 2700 | 2430 | 2180 | 1940 | 4050 | 3280 | 2640 | 2090 | 0.7 | 3.0 | 7.4 |
| 2450 | 2160 | 1910 | 1690 | 4000 | 3110 | 2430 | 1900 | 0.8 | 3.7 | 9.5 |
| 2530 | 2220 | 1940 | 1680 | 2840 | 2190 | 765 | 509 | 0.4 | 1.7 | 4.7 |
| 2530 | 2140 | 1820 | 1570 | 2840 | 2030 | 1470 | 1090 | 0.8 | 3.8 | 10.0 |
| 2400 | 1960 | 1580 | 1280 | 1920 | 1280 | 835 | 545 | 0.9 | 4.6 | 13.0 |
| 2100 | 1710 | 1390 | 1160 | 1950 | 1300 | 860 | 605 | 1.2 | 6.0 | 16.5 |
| 2710 | 2410 | 2130 | 1870 | 3260 | 2570 | 2000 | 1550 | Not Available | | |
| 2410 | 2190 | 1980 | 1790 | 3220 | 2660 | 2180 | 1780 | Not Available | | |
| 1850 | 1560 | 1310 | 1140 | 1370 | 975 | 685 | 520 | 1.5 | 7.8 | 21.5 |
| 2530 | 2210 | 1910 | 1640 | 2840 | 2160 | 1610 | 1190 | 0.8 | 3.6 | 9.4 |
| 2250 | 2010 | 1780 | 1570 | 2810 | 2230 | 1760 | 1370 | 1.0 | 4.4 | 11.0 |
| 2740 | 2460 | 2210 | 1990 | 4500 | 3620 | 2920 | 2370 | 0.7 | 2.9 | 7.1 |

Centerfire Rifle Cartridges (Cont.)

| Cartridge | Bullet | |
|-----------------------|----------|------|
| | Wt. Grs. | Type |
| 375 H&H Magnum | 300 | ST |
| 375 H&H Magnum | 300 | MC |
| 38-40 Winchester | 180 | SP |
| 44 Magnum* (c, d) | 240 | SP |
| 44 Magnum (b) | 240 | HSP |
| 444 Marlin (c) | 240 | SP |
| 44-40 Winchester* | 200 | SP |
| 45-70 Government | 405 | SP |
| 458 Winchester Magnum | 500 | MC |
| 458 Winchester Magnum | 510 | SP |

Weatherby Magnum Cartridges

| Cartridge | Bullet | | Velocity (fps) | | |
|---------------------------------|----------|------|----------------|----------|----------|
| | Wt. Grs. | Type | Muzzle | 100 yds. | 200 yds. |
| .224 Weatherby Varmintmaster | 50 | PE | 3750 | 3160 | 2625 |
| .224 Weatherby Varmintmaster | 55 | PE | 3650 | 3150 | 2685 |
| .240 Weatherby | 70 | PE | 3850 | 3395 | 2975 |
| .240 Weatherby | 90 | PE | 3500 | 3135 | 2795 |
| .240 Weatherby | 100 | PE | 3395 | 3115 | 2850 |
| .257 Weatherby | 87 | PE | 3825 | 3290 | 2835 |
| .257 Weatherby | 100 | PE | 3555 | 3150 | 2815 |
| .257 Weatherby | 117 | SPE | 3300 | 2900 | 2550 |
| .270 Weatherby | 100 | PE | 3760 | 3625 | 2825 |
| .270 Weatherby | 130 | PE | 3375 | 3050 | 2750 |
| .270 Weatherby | 150 | PE | 3245 | 2955 | 2675 |
| 7mm Weatherby | 139 | PE | 3300 | 2995 | 2715 |
| 7mm Weatherby | 154 | PE | 3160 | 2885 | 2640 |
| .300 Weatherby | 150 | PE | 3545 | 3195 | 2890 |

| Velocity (fps) | | | | Energy (ft. lbs.) | | | | Mid-Range Trajectory | | |
|----------------|------|------|------|-------------------|------|------|------|----------------------|------|------|
| | 100 | 200 | 300 | | 100 | 200 | 300 | 100 | 200 | 300 |
| Muzzle | yds. | yds. | yds. | Muzzle | yds. | yds. | yds. | yds. | yds. | yds. |
| 2550 | 2280 | 2040 | 1830 | 4330 | 3460 | 2770 | 2230 | 0.7 | 3.3 | 8.3 |
| 2550 | 2180 | 1860 | 1590 | 4330 | 3160 | 2300 | 1680 | 0.7 | 3.6 | 9.3 |
| 1330 | 1070 | 960 | 850 | 705 | 455 | 370 | 290 | 3.2 | 15.0 | 36.5 |
| 1750 | 1360 | 1110 | 980 | 1630 | 985 | 655 | 510 | 1.6 | 8.4 | — |
| 1750 | 1350 | 1090 | 950 | 1630 | 970 | 635 | 480 | 1.8 | 9.4 | 26.0 |
| 2400 | 1845 | 1410 | 1125 | 3070 | 1815 | 1060 | 675 | Not Available | | |
| 1310 | 1050 | 940 | 830 | 760 | 490 | 390 | 305 | 3.3 | 15.0 | 36.5 |
| 1320 | 1160 | 1050 | 990 | 1570 | 1210 | 990 | 880 | 2.9 | 13.0 | 32.5 |
| 2130 | 1910 | 1700 | 1520 | 5040 | 4050 | 3210 | 2570 | 1.1 | 4.8 | 12.0 |
| 2130 | 1840 | 1600 | 1400 | 5140 | 3830 | 2900 | 2220 | 1.1 | 5.1 | 13.5 |

CL—Core Lokt PCL—Pointed Core Lokt OPE—Open Point Expanding †PL—Power-Lokt (slightly higher price) (1) Not safe in handguns or Win. M73.

| Velocity (fps) | Energy (ft. lbs.) | | | | Mid-Range Trajectory | | |
|-------------------|-------------------|--------|----------|----------|----------------------|----------|----------|
| | 300 yds. | Muzzle | 100 yds. | 200 yds. | 300 yds. | 100 yds. | 200 yds. |
| 2140 | 1562 | 1109 | 765 | 509 | 0.7 | 3.6 | 9.0 |
| 2270 | 1627 | 1212 | 881 | 629 | 0.4 | 1.7 | 4.5 |
| 2585 | 2304 | 1788 | 1376 | 1038 | 0.3 | 1.5 | 3.9 |
| 2475 | 2444 | 1960 | 1559 | 1222 | 0.4 | 1.8 | 4.5 |
| 2595 | 2554 | 2150 | 1804 | 1495 | 0.4 | 1.8 | 4.4 |
| 2450 | 2828 | 2087 | 1553 | 1160 | 0.3 | 1.6 | 4.4 |
| 2500 | 2802 | 2199 | 1760 | 1338 | 0.4 | 1.7 | 4.4 |
| 2250 | 2824 | 2184 | 1689 | 1315 | 0.4 | 2.4 | 6.8 |
| 2435 | 3140 | 2363 | 1773 | 1317 | 0.4 | 1.6 | 4.3 |
| 2480 | 3283 | 2685 | 2183 | 1776 | 0.4 | 1.8 | 4.5 |
| 2430 | 3501 | 2909 | 2385 | 1967 | 0.5 | 2.0 | 5.0 |
| 2465 | 3355 | 2770 | 2275 | 1877 | 0.4 | 1.9 | 4.9 |
| 2415 | 3406 | 2874 | 2384 | 1994 | 0.5 | 2.0 | 5.0 |
| 2615 | 4179 | 3393 | 2783 | 2279 | 0.4 | 1.5 | 3.9 |

Weatherby Magnum Cartridges (Cont.)

| Cartridge | Bullet | | Velocity (fps) | | |
|----------------|----------|----------|----------------|----------|----------|
| | Wt. Grs. | Type | Muzzle | 100 yds. | 200 yds. |
| .300 Weatherby | 180 | PE | 3245 | 2960 | 2705 |
| .300 Weatherby | 220 | SPE | 2905 | 2610 | 2385 |
| .340 Weatherby | 200 | PE | 3210 | 2905 | 2615 |
| .340 Weatherby | 210 | Nosler | 3165 | 2910 | 2665 |
| .340 Weatherby | 250 | SPE | 2850 | 2580 | 2325 |
| .378 Weatherby | 270 | SPE | 3180 | 2850 | 2600 |
| .378 Weatherby | 300 | SPE, FMJ | 2925 | 2610 | 2380 |
| .460 Weatherby | 500 | RN, FMJ | 2700 | 2330 | 2005 |

Trajectory is given from scope height. Velocities chronographed using 26" bbls. Available with Nosler bullets. SPE—Semipointed Expanding RN—Round Nosed

Norma C.F. Rifle Cartridges

Norma ammunition loaded to standard velocity and pressure is now available with Nosler bullets in the following loads: .270 Win., 130-, 150-gr.; Super 7 x 61 (S&H), 160-gr.; .308 Win., 180-gr.; .30/06, 150-,

| Cartridge | Bullet | | Velocity (fps) | | |
|-----------------|----------|------|----------------|----------|----------|
| | Wt. Grs. | Type | Muzzle | 100 yds. | 200 yds. |
| .220 Swift | 50 | SP | 4111 | 3611 | 3133 |
| .222 Remington | 50 | SP | 3200 | 2660 | 2170 |
| .273 | 55 | SP | 3300 | 2900 | 2520 |
| .22/250 | 50 | SP | 3800 | 3300 | 2810 |
| | 55 | SP | 3650 | 3200 | 2780 |
| .243 Winchester | 80 | SP | 3500 | 3070 | 2660 |
| | 100 | SP | 3070 | 2790 | 2540 |
| 6mm Remington | 100 | SP | 3190 | 2920 | 2660 |
| .250 Savage | 87 | SP | 3032 | 2685 | 2357 |
| | 100 | SP | 2822 | 2514 | 2223 |
| 6.5 Carcano | 156 | SP | 2000 | 1810 | 1640 |
| 6.5 Japanese | 139 | SPBT | 2428 | 2280 | 2130 |
| | 156 | SP | 2067 | 1871 | 1692 |
| 6.5 x 54 MS | 139 | SPBT | 2580 | 2420 | 2270 |
| | 156 | SP | 2461 | 2240 | 2033 |
| 6.5 x 55 | 139 | SPBT | 2789 | 2630 | 2470 |
| | 156 | SP | 2493 | 2271 | 2062 |

| Velocity (fps) 300 yds. | Energy (ft. lbs.) | | | | Mid-Range Trajectory | | |
|-------------------------------|-------------------|----------|----------|----------|----------------------|----------|----------|
| | Muzzle | 100 yds. | 200 yds. | 300 yds. | 100 yds. | 200 yds. | 300 yds. |
| 2475 | 4201 | 3501 | 2925 | 2448 | 0.4 | 1.9 | 5.2 |
| 2150 | 4123 | 3329 | 2757 | 2257 | 0.6 | 2.5 | 6.7 |
| 2345 | 4566 | 3748 | 3038 | 2442 | 0.5 | 2.1 | 5.3 |
| 2435 | 4660 | 3948 | 3312 | 2766 | 0.5 | 2.1 | 5.0 |
| 2090 | 4510 | 3695 | 3000 | 2425 | 0.6 | 2.7 | 6.7 |
| 2315 | 6051 | 4871 | 4053 | 3210 | 0.5 | 2.0 | 5.2 |
| 2125 | 5700 | 4539 | 3774 | 3009 | 0.6 | 2.5 | 6.2 |
| 1730 | 8095 | 6025 | 4465 | 3320 | 0.7 | 3.3 | 10.0 |

PE—Pointed Expanding FMJ—Full Metal Jacket.

180-gr., all at slightly higher prices. All ballistic figures are computed from a line of sight one inch above center of bore at muzzle. Prices subject to change.

| Velocity (fps) 300 yds. | Energy (ft. lbs.) | | | | Max. height of trajectory, inches | | |
|-------------------------------|-------------------|----------|----------|----------|--------------------------------------|----------|----------|
| | Muzzle | 100 yds. | 200 yds. | 300 yds. | 100 yds. | 200 yds. | 300 yds. |
| 2681 | 1877 | 1448 | 1090 | 799 | .2 | .9 | 3.0 |
| 1750 | 1137 | 786 | 523 | 340 | .0 | 2.0 | 6.2 |
| 2160 | 1330 | 1027 | 776 | 570 | .4 | 2.4 | 6.8 |
| 2350 | 1600 | 1209 | 885 | 613 | Not Available | | |
| 2400 | 1637 | 1251 | 944 | 704 | Not Available | | |
| 2290 | 2041 | 1570 | 1179 | 873 | .0 | 1.4 | 4.1 |
| 2320 | 2093 | 1729 | 1433 | 1195 | .1 | 1.8 | 5.0 |
| 2420 | 2260 | 1890 | 1570 | 1300 | .4 | 2.1 | 5.3 |
| 2054 | 1776 | 1393 | 1074 | 815 | .0 | 1.9 | 5.8 |
| 1956 | 1769 | 1404 | 1098 | 850 | .1 | 2.2 | 6.6 |
| 1485 | 1386 | 1135 | 932 | 764 | Not Available | | |
| 1990 | 1820 | 1605 | 1401 | 1223 | .3 | 2.8 | 7.7 |
| 1529 | 1481 | 1213 | 992 | 810 | .6 | 4.4 | 11.9 |
| 2120 | 2056 | 1808 | 1591 | 1388 | .2 | 2.4 | 6.5 |
| 1840 | 2098 | 1738 | 1432 | 1173 | .3 | 3.0 | 8.2 |
| 2320 | 2402 | 2136 | 1883 | 1662 | .1 | 2.0 | 5.6 |
| 1867 | 2153 | 1787 | 1473 | 1208 | .3 | 2.9 | 7.9 |

Norma C.F. Rifle Cartridges (Cont.)

| Cartridge | Bullet | | Velocity (fps) | | |
|---------------------------------------|----------|-------------|----------------|----------|----------|
| | Wt. Grs. | Type | Muzzle | 100 yds. | 200 yds. |
| .270 Winchester | 110 | SP | 3248 | 2966 | 2694 |
| | 130 | SPBT | 3140 | 2884 | 2639 |
| | 150 | SPBT | 2802 | 2616 | 2436 |
| 7.5 x 55 Schmidt Rubin (7.5 Swiss) | 180 | SP | 2650 | 2450 | 2260 |
| 7 x 57 | 110 | SP | 3068 | 2792 | 2528 |
| | 150 | SPBT | 2756 | 2539 | 2331 |
| | 175 | SP | 2490 | 2170 | 1900 |
| 7mm Remington Magnum | 150 | SP | 3260 | 2970 | 2700 |
| | 175 | SP | 3070 | 2720 | 2400 |
| 7 x 61 S & H (26 in.) | 160 | SPBT | 3100 | 2927 | 2757 |
| .30 U.S. Carbine | 110 | SPRN | 1970 | 1595 | 1300 |
| .308 Winchester | 130 | SPBT | 2900 | 2590 | 2300 |
| | 150 | SPBT | 2860 | 2570 | 2300 |
| | 180 | SPBT | 2610 | 2400 | 2210 |
| | 180 | SP | 2610 | 2400 | 2210 |
| | 180 | PSPBT | 2624 | 2415 | 2222 |
| 7.62 Russian | 180 | DC | 3100 | 2881 | 2668 |
| .308 Norma Mag. .30/06 | 130 | PSPBT | 3281 | 2951 | 2636 |
| | 150 | PS | 2972 | 2680 | 2402 |
| | 180 | PSPBT, SPDC | 2700 | 2494 | 2296 |
| | 220 | SPRN | 2411 | 2197 | 1996 |
| | 220 | FJBT | 2410 | 2197 | 1996 |
| | 180 | SPDC | 2700 | 2494 | 2296 |
| | 150 | SP | 2920 | 2630 | 2355 |
| 7.65 Argentine .303 British | 130 | SP | 2789 | 2483 | 2195 |
| | 150 | SP | 2720 | 2440 | 2170 |
| | 180 | SPBT | 2540 | 2340 | 2147 |
| | 130 | SP | 2950 | 2635 | 2340 |
| 7.7 Japanese | 180 | SPBT | 2493 | 2292 | 2101 |
| | 123 | SP | 2888 | 2515 | 2170 |
| 8mm Mauser (.323 in.) | 165 | SP | 2855 | 2563 | 2285 |
| | 196 | SP | 2526 | 2195 | 1894 |
| | 250 | SP | 2250 | 2010 | 1780 |
| .358 Winchester | 250 | SP | 2790 | 2493 | 2231 |
| .358 Norma Mag. | 240 | SPFP | 1705 | | |
| .44 Magnum | 236 | HP | 1705 | | |

P—Pointed Nose SP—Soft Point HP—Hollow Point FP—Flat Point RN—Round Nose BT—Boat Tail MC—Metal Case DC—Dual Core SPS—Soft Point

| Velocity (fps) 300 yds. | Energy (ft. lbs.) | | | | Max. height of trajectory, inches | | |
|-------------------------------|-------------------|----------|----------|----------|--------------------------------------|----------|----------|
| | Muzzle | 100 yds. | 200 yds. | 300 yds. | 100 yds. | 200 yds. | 300 yds. |
| 2435 | 2578 | 2150 | 1773 | 1448 | .1 | 1.4 | 4.3 |
| 2404 | 2847 | 2401 | 2011 | 1669 | .0 | 1.6 | 4.7 |
| 2262 | 2616 | 2280 | 1977 | 1705 | .1 | 2.0 | 5.7 |
| 2060 | 2792 | 2350 | 1990 | 1665 | Not Available | | |
| 2277 | 2300 | 1904 | 1561 | 1267 | .0 | 1.6 | 5.0 |
| 2133 | 2530 | 2148 | 1810 | 1516 | .1 | 2.2 | 6.2 |
| 1680 | 2410 | 1830 | 1403 | 1097 | .4 | 3.3 | 9.0 |
| 2450 | 3540 | 2945 | 2435 | 1990 | .4 | 2.0 | 4.9 |
| 2120 | 3660 | 2870 | 2240 | 1590 | .5 | 2.4 | 6.1 |
| 2595 | 3415 | 3045 | 2701 | 2393 | .0 | 1.5 | 4.3 |
| 1090 | 948 | 622 | 413 | 290 | .8 | 6.4 | 19.0 |
| 2030 | 2428 | 1937 | 1527 | 1190 | .1 | 2.1 | 6.2 |
| 2050 | 2725 | 2200 | 1762 | 1400 | .1 | 2.0 | 5.9 |
| 2020 | 2725 | 2303 | 1952 | 1631 | .2 | 2.5 | 6.6 |
| 2020 | 2725 | 2303 | 1952 | 1631 | .7 | 3.4 | 8.9 |
| 2030 | 2749 | 2326 | 1970 | 1644 | .2 | 2.5 | 6.6 |
| 2464 | 3842 | 3318 | 2846 | 2427 | .0 | 1.6 | 4.6 |
| 2338 | 3108 | 2514 | 2006 | 1578 | .1 | 1.5 | 4.6 |
| 2141 | 2943 | 2393 | 1922 | 1527 | .0 | 1.9 | 5.7 |
| 2109 | 2914 | 2487 | 2107 | 1778 | .1 | 2.3 | 6.4 |
| 1809 | 2840 | 2358 | 1947 | 1599 | .3 | 3.1 | 8.5 |
| 1809 | 2840 | 2358 | 1947 | 1599 | Not Available | | |
| 2109 | 2914 | 2487 | 2107 | 1778 | Not Available | | |
| 2105 | 2841 | 2304 | 1848 | 1476 | .1 | 2.0 | 5.8 |
| 1929 | 2246 | 1780 | 1391 | 1075 | .1 | 2.3 | 6.7 |
| 1930 | 2465 | 1983 | 1569 | 1241 | .1 | 2.2 | 6.5 |
| 1965 | 2579 | 2189 | 1843 | 1544 | .2 | 2.7 | 7.3 |
| 2065 | 2513 | 2004 | 1581 | 1231 | .1 | 2.0 | 5.9 |
| 1922 | 2484 | 2100 | 1765 | 1477 | .3 | 2.8 | 7.7 |
| 1857 | 2277 | 1728 | 1286 | 942 | Not Available | | |
| 2028 | 2894 | 2405 | 1912 | 1506 | Not Available | | |
| 1627 | 2778 | 2097 | 1562 | 1152 | Not Available | | |
| 1570 | 2811 | 2243 | 1759 | 1369 | Not Available | | |
| 2001 | 4322 | 3451 | 2764 | 2223 | .2 | 2.4 | 6.6 |
| | 1526 | | | | Not Available | | |
| | 1526 | | | | | | |

Semi-Pointed NA—Not announced.

Speer-DWM C.F. Rifle Cartridges

These DWM metric calibers are imported by Speer, Inc. The Starkmantel (strong-jacket, soft-point) bullets have apparently been discontinued.

| Caliber | Bullet | | Velocity (fps) | | |
|-------------------------|--------|-----------|----------------|----------|----------|
| | Wt. | Grs. Type | Muzzle | 100 yds. | 200 yds. |
| 5.6 x 35R Vierling | 46 | SP | 2030 | 1500 | 1140 |
| 5.6 x 50R (Rimmed) Mag. | 50 | PSP | Not Available | | |
| 5.6 x 52R (Savage H.P.) | 71 | PSP | 2850 | 2460 | 2320 |
| 5.6 x 61 SE | 77 | PSP | 3700 | 3360 | 3060 |
| 5.6 x 61 R | 77 | PSP | 3480 | 3140 | 2840 |
| 6.5 x 54 MS | 159 | SP | 2170 | 1925 | 1705 |
| 6.5 x 57 Mauser | 93 | PSP | 3350 | 2930 | 2570 |
| 6.5 x 57 R | 93 | PSP | 3350 | 2930 | 2570 |
| 7 x 57 Mauser | 103 | PSP | 3330 | 2865 | 2450 |
| | 162 | TIG | 2785 | 2480 | 2250 |
| 7 x 57 R | 103 | PSP | 3260 | 2810 | 2390 |
| | 139 | SP | 2550 | 2240 | 1960 |
| | 162 | TIG | 2710 | 2420 | 2210 |
| 7 x 64 | 103 | PSP | 3572 | 3110 | 2685 |
| | 139 | SP | 3000 | 2570 | 2260 |
| | 162 | TIG | 2960 | 2603 | 2375 |
| | 177 | TIG | 2880 | 2665 | 2490 |
| 7 x 65 R | 103 | PSP | 3480 | 3010 | 2590 |
| | 139 | SP | 3000 | 2570 | 2260 |
| | 162 | TIG | 2887 | 2540 | 2320 |
| | 177 | TIG | 2820 | 2600 | 2420 |
| 7mm SE | 169 | ToSto | 3300 | 3045 | 2825 |
| 7 x 75 R SE | 169 | ToSto | 3070 | 2840 | 2630 |
| .30/06 | 180 | TUG | 2854 | 2562 | 2306 |
| 8 x 57 JS | 123 | SP | 2968 | 2339 | 1805 |
| | 198 | TIG | 2732 | 2415 | 2181 |
| 8 x 57 JR | 196 | SP | 2391 | 1991 | 1742 |
| 8 x 57 JRS | 123 | SP | 2970 | 2340 | 1805 |
| | 196 | SP | 2480 | 2140 | 1870 |
| | 198 | TIG | 2600 | 2320 | 2105 |
| | 196 | SP | 2585 | 2162 | 1890 |
| 8 x 60 S | 198 | TIG | 2780 | 2450 | 2205 |
| | 293 | TUG | 2515 | 2310 | 2150 |
| 9.3 x 62 | 293 | TUG | 2640 | 2450 | 2290 |
| 9.3 x 64 | 193 | FP | 1925 | 1600 | 1400 |
| 9.3 x 72 R | 293 | TUG | 2360 | 2160 | 1998 |

FP—Flat Point SP—Soft Point PSP—Pointed Soft Point TIG—Brenneke Torpedo Ideal TUG—Brenneke Torpedo Universal ToSto—vom Hofe Torpedo

tinued. Metric cases and bullets for calibers listed may be special-ordered from Speer.

| Velocity (fps) 300 yds. | Energy (ft. lbs.) | | | | Mid-Range Trajectory | | |
|-------------------------------|-------------------|----------|----------|----------|----------------------|----------|----------|
| | Muzzle | 100 yds. | 200 yds. | 300 yds. | 100 yds. | 200 yds. | 300 yds. |
| | 418 | 224 | 130 | | 1.2 | 7.5 | |
| Not Available | | | | | | | |
| 2200 | 1280 | 947 | 846 | 766 | .3 | 2.3 | 6.5 |
| 2790 | 2350 | 1920 | 1605 | 1345 | .1 | 1.1 | 3.4 |
| 2560 | 2070 | 1690 | 1370 | 1120 | .1 | 1.3 | 4.0 |
| 1485 | 1660 | 1300 | 1025 | 810 | .5 | 4.1 | 11.5 |
| 2260 | 2300 | 1760 | 1350 | 1040 | .1 | 1.7 | 4.8 |
| 2260 | 2300 | 1760 | 1350 | 1040 | .1 | 1.7 | 4.8 |
| 2060 | 2550 | 1890 | 1380 | 977 | .1 | 1.7 | 5.2 |
| 2060 | 2780 | 2200 | 1820 | 1520 | .3 | 2.4 | 6.7 |
| 2000 | 2430 | 1820 | 1320 | 920 | .1 | 1.8 | 5.3 |
| 1720 | 2000 | 1540 | 1190 | 910 | .3 | 2.9 | 8.6 |
| 2020 | 2640 | 2120 | 1750 | 1460 | .3 | 2.4 | 6.9 |
| 2283 | 2930 | 2230 | 1670 | 1190 | .1 | 1.4 | 4.4 |
| 1980 | 2780 | 2040 | 1570 | 1200 | .2 | 2.2 | 6.4 |
| 2200 | 3150 | 2440 | 2030 | 1740 | .2 | 2.0 | 6.0 |
| 2325 | 3270 | 2820 | 2440 | 2130 | .2 | 2.0 | 5.6 |
| 2200 | 2770 | 2100 | 1540 | 1120 | .1 | 1.5 | 4.7 |
| 1980 | 2780 | 2040 | 1570 | 1200 | .2 | 2.2 | 6.4 |
| 2140 | 3000 | 2320 | 1930 | 1650 | .2 | 2.2 | 6.3 |
| 2255 | 3120 | 2660 | 2300 | 2000 | .2 | 2.1 | 5.9 |
| 2620 | 4090 | 3480 | 3010 | 2600 | .1 | 1.4 | 3.9 |
| 2430 | 3550 | 3050 | 2620 | 2240 | .1 | 1.6 | 4.5 |
| 2077 | 3261 | 2632 | 2133 | 1726 | .2 | 2.2 | 6.3 |
| 1318 | 2415 | 1497 | 897 | 477 | .2 | 2.7 | 8.8 |
| 1985 | 3276 | 2560 | 2083 | 1736 | .3 | 2.5 | 7.1 |
| 1565 | 2488 | 1736 | 1316 | 1056 | .5 | 3.9 | 11.2 |
| 1318 | 2415 | 1497 | 897 | 477 | .2 | 2.7 | 8.8 |
| 1640 | 2680 | 2000 | 1510 | 1165 | .4 | 3.3 | 9.4 |
| 1930 | 2970 | 2350 | 1950 | 1620 | .3 | 2.7 | 7.6 |
| 1690 | 2905 | 2030 | 1560 | 1245 | .4 | 3.2 | 9.2 |
| 2010 | 3390 | 2625 | 2130 | 1770 | .3 | 2.4 | 6.9 |
| 2020 | 4110 | 3480 | 3010 | 2634 | .3 | 2.8 | 7.5 |
| 2145 | 4550 | 3900 | 3410 | 3000 | .3 | 2.4 | 6.6 |
| 1245 | 1590 | 1090 | 835 | 666 | .5 | 5.7 | 16.6 |
| 1870 | 3580 | 3000 | 2560 | 2250 | .3 | 3.1 | 8.7 |

Stopring.

British Centerfire Rifle Cartridges

| Cartridge | Case length inches | Bullet weight (grs.) | Powder weight (grs.) |
|---------------------------|--------------------|----------------------|----------------------|
| *.297/230 (Morris) Short | $\frac{9}{16}$ | 37L | 1 $\frac{3}{4}$ RN |
| *.297/230 (Morris) Long | $\frac{3}{4}$ | 37L | 2 $\frac{3}{4}$ CN |
| *p.240 H&H Apex Flanged | 2 $\frac{1}{2}$ | 100CP | 38 $\frac{1}{2}$ NC |
| .240 Belted Rimless | 2 $\frac{1}{2}$ | 100CP | 40 $\frac{1}{2}$ NC |
| *.242 Rimless Nitro Exp. | 2 $\frac{3}{8}$ | 100CP | 42 NC |
| .244 H&H Magnum (Belted) | 2 $\frac{3}{4}$ | 100CP | |
| .297/250 Rook Rifle | 1 $\frac{1}{16}$ | 56L | 3 CN |
| .256 (6.5mm) Mannlicher | 2 $\frac{1}{8}$ | 160SN | 36 NC |
| 6.5mm Mann.-Schon. | 2 $\frac{1}{8}$ | 160SN | 36 NC |
| .275 H&H Magnum (Belted) | 2 $\frac{1}{2}$ | 160CP | 52 NC |
| .275 High Velocity (7mm) | 2 $\frac{1}{4}$ | 140CP | 48 NC |
| .276 (7mm) Mauser | 2 $\frac{1}{4}$ | 173SN | 38 NC |
| p7mm H&H Magnum Flanged | 2 $\frac{1}{2}$ | 140CP | |
| *.280 Flanged Nitro Exp. | 2 $\frac{5}{8}$ | 140CP | 52 NC |
| *.280 Flanged Nitro Exp. | 2 $\frac{5}{8}$ | 160HP | 52 NC |
| .280 Ross Rimless Nitro | 2 $\frac{5}{8}$ | 140CP | 54 NC |
| .280 Ross Rimless Nitro | | 160HP | 54 NC |
| *.280 Jeffery Rimless | 2 $\frac{1}{2}$ | 140CP | 57 NC |
| .300 (.295) Rook Rifle | 1 $\frac{1}{8}$ | 80L | 4 $\frac{1}{2}$ CN |
| .300 Sherwood | 1 $\frac{1}{2}$ | 140L | 8 $\frac{1}{2}$ CN |
| .300 H&H Magnum Belted | 2 $\frac{3}{4}$ | 150SN | 58 C |
| or (.30 Super Magnum) | | 180SN | 55 C |
| or (.30 Super Magnum) | | 220SN | 49 C |
| p.30 Super Flanged H&H | 2 $\frac{3}{4}$ | 150SN | 55 C |
| p.30 Super Flanged H&H | | 180SN | 50 C |
| p.30 Super Flanged H&H | | 220SN | 46 C |
| *.30 Purdey Flanged Nitro | 2 $\frac{3}{8}$ | 150SN | |
| .303 British (Mark 6) | 2 $\frac{1}{4}$ | 215S | 31 C |
| .303 British (Mark 7) | 2 $\frac{1}{4}$ | 174S | 37 C |
| .303 British | 2 $\frac{1}{4}$ | 150CP | 38 C |
| .303 British | 2 $\frac{1}{4}$ | 174SN | 41 NC |
| .303 British | 2 $\frac{1}{4}$ | 215SN | 31 C |
| .310 Cadet | 1 $\frac{1}{8}$ | 120L | 6 CN |
| .318 Rimless Nitro Exp. | 2 $\frac{3}{8}$ | 180CP | 55 NC |
| .318 Rimless Nitro Exp. | | 250SN | 52 NC |
| .333 Rimless Nitro Exp. | 2 $\frac{3}{8}$ | 300SN | 65 NC |
| *.400/350 Nitro Exp. | 2 $\frac{3}{4}$ | 310SN | 43 NC |

| Velocity (fps) | | | Energy (ft. lbs.) | | | Drop (in.)† | |
|----------------|----------|----------|-------------------|----------|----------|-------------|----------|
| Muzzle | 100 yds. | 200 yds. | Muzzle | 100 yds. | 200 yds. | 100 yds. | 200 yds. |
| 875 | 720 | | 63 | 43 | | 15.0 | |
| 1200 | 920 | 760 | 120 | 70 | 48 | 15.0 | 7.10 |
| 2800 | 2570 | 2355 | 1740 | 1470 | 1230 | 2.3 | 10.0 |
| 2900 | 2665 | 2445 | 1870 | 1580 | 1330 | 2.2 | 9.2 |
| 3000 | 2740 | 2490 | 1970 | 1635 | 1355 | 2.0 | 8.6 |
| 3500 | 3230 | 2970 | 2725 | 2320 | 1980 | 1.6 | 5.1 |
| 1150 | 940 | 805 | 165 | 110 | 80 | 15.5 | 70.0 |
| 2350 | 2045 | 1765 | 1960 | 1490 | 1110 | 3.4 | 15.5 |
| 2300 | 2000 | 1725 | 1880 | 1420 | 1060 | 3.6 | 16.0 |
| 2700 | 2505 | 2320 | 2600 | 2230 | 1920 | 2.5 | 10.5 |
| 2900 | 2705 | 2515 | 2620 | 2280 | 1970 | 2.2 | 9.0 |
| 2300 | 2015 | 1765 | 2040 | 1560 | 1200 | 3.9 | 16.0 |
| 2650 | 2450 | | 2184 | 1867 | | | |
| 2800 | 2570 | 2355 | 2440 | 2060 | 1730 | 2.3 | 10.0 |
| 2600 | 2300 | 2020 | 2400 | 1880 | 1450 | 2.8 | 12.0 |
| 2900 | 2665 | 2445 | 2620 | 2210 | 1860 | 2.2 | 9.0 |
| 2700 | 2395 | 2110 | 2600 | 2040 | 1580 | 2.6 | 11.5 |
| 3000 | 2870 | 2735 | 2800 | 2555 | 2390 | 2.1 | 10.0 |
| 1100 | 915 | 785 | 215 | 150 | 110 | 16.5 | 75.0 |
| 1400 | 1195 | 1060 | 610 | 445 | 350 | 9.9 | 44.0 |
| 3000 | 2660 | 2350 | 3000 | 2360 | 1835 | 2.2 | 9.8 |
| 2750 | 2430 | 2130 | 3020 | 2360 | 1815 | 2.8 | 12.5 |
| 2300 | 2045 | 1810 | 2115 | 1675 | 1305 | 3.9 | 17.0 |
| 2875 | 2581 | | 2755 | 2225 | | | |
| 2575 | 2309 | | 2653 | 2131 | | | |
| 2250 | 2045 | | 2475 | 2045 | | | |
| 2700 | 2385 | 2090 | 2430 | 1900 | 1460 | 2.6 | 11.5 |
| 2050 | 1855 | 1670 | 2010 | 1650 | 1330 | 4.4 | 19.0 |
| 2450 | 2250 | 2055 | 2320 | 1960 | 1640 | 3.0 | 13.0 |
| 2700 | 2465 | 2240 | 2440 | 2030 | 1680 | 2.5 | 11.0 |
| 2450 | 2195 | 1955 | 2315 | 1870 | 1480 | 3.1 | 13.5 |
| 2050 | 1790 | 1555 | 2010 | 1530 | 1160 | 4.6 | 20.0 |
| 1200 | 1010 | 890 | 385 | 270 | 210 | 14.0 | 62.0 |
| 2700 | 2395 | 2110 | 2920 | 2300 | 1780 | 2.6 | 11.5 |
| 2400 | 2040 | 1715 | 3200 | 2320 | 1640 | 3.3 | 15.0 |
| 2200 | 1950 | 1720 | 3230 | 2540 | 1980 | 3.9 | 17.0 |
| 2000 | 1795 | 1610 | 2760 | 2220 | 1790 | 4.7 | 20.0 |

British Centerfire Rifle Cartridges (Cont.)

| Cartridge | Case length inches | Bullet weight (grs.) | Powder weight (grs.) |
|-----------------------------|--------------------|----------------------|----------------------|
| .350 Rigby Magnum Rimless | 2¾ | 225SN | 65 NC |
| .350 No. 2 Rigby Flanged | 2¾ | 225SN | |
| *.360 Nitro Exp. Flanged | 2¼ | 300SN | 30 C |
| *.360 Nitro for Black Powd. | 2¼ | 190CT | 22 C |
| o.400/360 Purdey Flanged | 2¾ | 300SN | 40 C |
| o.400/360 Westley Richards | 2¾ | 314SN | 41 C |
| o.360 No. 2 Nitro Exp. | 3 | 320SN | 55 C |
| o.369 Purdey Nitro Exp. | 2⅝ | 270SN | 64½ NC |
| .375 Flanged Nitro Exp. | 2½ | 270SN | 40 C |
| o.375 Rimless W.R. Nitro | 2¼ | 270SN | 43 C |
| .375 Flanged Magnum Nitro | 2⅞ | 270SN | 59 C |
| .375 Flanged Magnum Nitro | | 300SN | 56 C |
| .375 Belted H&H Magnum | 2⅞ | 235CP | 62 C |
| .375 Belted H&H Magnum | | 270SN | 61 C |
| .375 Belted H&H Magnum | | 300SN | 58 C |
| .450/400 Nitro Exp. | 3 | 400SN | 60 C |
| .450/400 Magnum Nitro Exp. | 3¼ | 400SN | 60 C |
| .404 Jeffery Rimless | 2⅞ | 400SN | 60 C |
| p.416 Rigby Magnum | 2⅞ | 410SN | 71 C |
| p.425 Westley Richards | 2⅝ | 410SN | |
| o.450 Nitro Exp. | 3¼ | 480SN | 70 C |
| *.500/450 Magnum Nitro Exp. | 3¼ | 480SN | 75 C |
| o.450 No. 2 Nitro Exp. | 3½ | 480SN | 80 C |
| o.450 Black Powder Exp. | 3¼ | 310L | 120 Blk |
| o.450 Nitro for B.P. Exp. | 3¼ | 365CT | 52 C |
| .577/450 Martini-Henry | 2¼ | 480L | 38½ C |
| .577/450 Martini-Henry B.P. | 2¼ | 480L | 85 Blk |
| .465 H&H Nitro Exp. | 3¼ | 480SN | 73 C |
| .470 Nitro Exp. | 3¼ | 500SN | 75 C |
| *.475 Nitro Exp. | 3¼ | 480SN | 75 C |
| r.475 No. 2 Nitro Exp. | 3½ | 480SN | 85 C |
| o.475 No. 2 Jeffery | 3½ | 500SN | 85 C |
| o.476 Nitro Exp. | 3 | 520SN | 75 C |
| .500 Nitro Exp. | 3 | 570SN | 80 C |
| *.500 Nitro for B.P. Exp. | 3 | 440CT | 55 C |
| o.500 Black Powder Exp. | 3 | 340CT | 136 Blk |
| p.500 Jeffery Rimless | | 535SN | 95 C |

| Velocity (fps) | | | Energy (ft. lbs.) | | | Drop (in.)† | |
|----------------|----------|----------|-------------------|----------|----------|-------------|----------|
| Muzzle | 100 yds. | 200 yds. | Muzzle | 100 yds. | 200 yds. | 100 yds. | 200 yds. |
| 2625 | 2307 | | 3440 | 2657 | | | |
| 2600 | | | 3400 | | | | |
| 1650 | 1490 | 1355 | 1820 | 1480 | 1210 | 6.9 | 29.0 |
| 1650 | 1285 | 1070 | 1150 | 700 | 485 | 7.6 | 36.0 |
| 1950 | 1776 | | 2537 | 2102 | | | |
| 1900 | 1724 | | 2520 | 2072 | | | |
| 2200 | 1999 | | 3442 | 2845 | | | |
| 2500 | 2135 | 1800 | 3760 | 2740 | 1950 | 3.1 | 14.0 |
| 2000 | 1735 | 1405 | 2400 | 1810 | 1190 | 4.9 | 22.0 |
| 2100 | 1870 | | 2640 | 2100 | | | |
| 2600 | 2280 | 1980 | 4060 | 3120 | 2360 | 2.8 | 12.5 |
| 2400 | 2105 | 1825 | 3850 | 2960 | 2220 | 3.3 | 14.5 |
| 2800 | 2495 | 2215 | 4100 | 3260 | 2560 | 2.4 | 10.5 |
| 2650 | 2325 | 2020 | 4220 | 3250 | 2450 | 2.9 | 12.0 |
| 2500 | 2200 | 1915 | 4170 | 3230 | 2450 | 3.0 | 13.5 |
| 2100 | 1845 | 1610 | 3920 | 3030 | 2310 | 4.3 | 19.0 |
| 2150 | 1890 | 1650 | 4110 | 3180 | 2420 | 4.1 | 18.0 |
| 2125 | 1885 | 1670 | 4020 | 3160 | 2480 | 4.2 | 18.0 |
| 2371 | 2110 | | 5100 | | | | |
| 2350 | | | 5010 | | | | |
| 2150 | 1900 | 1665 | 4930 | 3860 | 2960 | 4.1 | 18.0 |
| 2175 | 1987 | | 5050 | 4220 | | | |
| 2175 | 1904 | | 5050 | 3900 | | | |
| 1800 | 1510 | | 2240 | 1570 | | | |
| 2100 | 1809 | | 3578 | 2655 | | | |
| 1350 | 1210 | 1110 | 1950 | 1560 | 1320 | 10.0 | 44.0 |
| 1350 | 1210 | 1110 | 1950 | 1560 | 1320 | 10.0 | 44.0 |
| 2150 | 1830 | 1620 | 4930 | 3580 | 2800 | 4.1 | 18.5 |
| 2150 | 1890 | 1650 | 5140 | 3980 | 3030 | 4.1 | 18.0 |
| 2175 | 2000 | 1830 | 5040 | 4260 | 3580 | 4.2 | 18.0 |
| 2200 | 1925 | 1680 | 5170 | 3960 | 3020 | 3.9 | 17.0 |
| 2150 | 1880 | 1635 | 5140 | 3930 | 2970 | 4.1 | 18.0 |
| 2100 | 1925 | 1760 | 5085 | 4295 | 3585 | 4.6 | 20.0 |
| 2150 | 1890 | 1650 | 5850 | 4530 | 3450 | 4.1 | 18.0 |
| 1900 | 1570 | 1290 | 3530 | 2410 | 1630 | 5.5 | 25.0 |
| 1925 | 1585 | | 2800 | 1900 | | | |
| 2400 | | | 6800 | | | | |

British Centerfire Rifle Cartridges (Cont.)

| Cartridge | Case length inches | Bullet weight (grs.) | Powder weight (grs.) |
|----------------------------|--------------------|----------------------|----------------------|
| p.505 Gibbs Rimless Magnum | | 525SN | 90 C |
| .577 Solid Snider | 1 $\frac{7}{8}$ | 480L | 70 Blk |
| r.577 Nitro Exp. | 3 | 750SN | 100 C |
| o.600Nitro Exp. | 3 | 900S | 110 C |

Abbreviations: BP or Blk—Black Powder C—Cordite NC—Nitro Cellulose
CM—Cadet Moonite RM—Revolver Moonite.

*Discontinued: SN—Soft Nose CP—Copper Point CT—Copper Tube L—Lead
HP—Hollow Point S—Solid (Jacketed)

†—Drop is computed from horizontal line of departure for the bullet.

CIL Ballistics Table

| Description | Bullet | | Velocity (fps) | | |
|----------------------|----------|------|----------------|----------|----------|
| | Wt. Grs. | Type | Muzzle | 100 yds. | 200 yds. |
| 22 Hornet | 45 | PSP | 2690 | 2030 | 1510 |
| 22 Savage | 70 | PSP | 2800 | 2440 | 2110 |
| 222 Remington | 50 | PSP | 3200 | 2600 | 2170 |
| 243 Winchester | 75 | PSP | 3500 | 3070 | 2660 |
| 243 Winchester | 100 | PSP | 3070 | 2790 | 2540 |
| 244 Remington | 75 | PSP | 3500 | 3070 | 2660 |
| 6.5 x 53mm Man.-Sch. | 160 | SP | 2160 | 1950 | 1750 |
| 6.5 x 55mm | 160 | SP | 2420 | 2190 | 1960 |
| 25-20 Winchester | 86 | SP | 1460 | 1180 | 1030 |
| 25-35 Winchester | 117 | SP | 2300 | 1910 | 1600 |
| 250 Savage | 100 | PSP | 2820 | 2460 | 2140 |
| 257 Roberts | 117 | PSP | 2650 | 2280 | 1950 |
| 270 Winchester | 100 | PSP | 3480 | 3070 | 2690 |
| 270 Winchester | 130 | PSP | 3140 | 2850 | 2580 |
| 270 Winchester | 160 | KKSP | 2800 | 2530 | 2280 |
| 7 x 57mm Mauser | 139 | PSP | 2800 | 2500 | 2240 |
| 7 x 57mm Mauser | 160 | KKSP | 2650 | 2330 | 2040 |
| 7mm Remington Magnum | 175 | SP | 3070 | 2720 | 2400 |
| 30-30 Winchester | 150 | PNEU | 2410 | 2020 | 1700 |
| 30-30 Winchester | 170 | KKSP | 2220 | 1890 | 1630 |
| 30-30 Winchester | 170 | ST | 2220 | 1890 | 1630 |

| Velocity (fps) | | | Energy (ft. lbs.) | | | Drop (in.)† | |
|----------------|----------|----------|-------------------|----------|----------|-------------|----------|
| Muzzle | 100 yds. | 200 yds. | Muzzle | 100 yds. | 200 yds. | 100 yds. | 200 yds. |
| 2300 | | | 6180 | | | | |
| 1250 | 1055 | 940 | 1670 | 1190 | 940 | 13.0 | 57.0 |
| 2050 | 1795 | 1570 | 7010 | 5380 | 4110 | 4.5 | 20.0 |
| 1950 | 1650 | 1390 | 7600 | 5450 | 3870 | 5.1 | 23.0 |

*—Available while stocks last; will then become obsolete.

o—Obsolete; no longer available.

r—Re-introduced and again available.

p—Proprietary Cartridge; available only from specific maker.

| Velocity (fps) | | | Energy (ft. lbs.) | | | | | |
|----------------|----------|----------|-------------------|----------|----------|----------|----------|----------|
| 300 yds. | 400 yds. | 500 yds. | Muzzle | 100 yds. | 200 yds. | 300 yds. | 400 yds. | 500 yds. |
| 1150 | — | — | 720 | 410 | 230 | 130 | — | — |
| 1840 | — | — | 1220 | 925 | 690 | 525 | — | — |
| 1750 | — | — | 1140 | 785 | 520 | 340 | — | — |
| 2290 | 1960 | 1670 | 2040 | 1570 | 1180 | 875 | 640 | 465 |
| 2320 | 2120 | 1940 | 2090 | 1730 | 1430 | 1190 | 995 | 835 |
| 2290 | 1960 | 1670 | 2040 | 1570 | 1180 | 875 | 640 | 465 |
| 1570 | — | — | 1660 | 1350 | 1090 | 875 | — | — |
| 1760 | 1580 | 1420 | 2080 | 1700 | 1360 | 1110 | 885 | 715 |
| 940 | — | — | 405 | 265 | 200 | 170 | — | — |
| 1340 | — | — | 1370 | 945 | 665 | 465 | — | — |
| 1870 | — | — | 1760 | 1340 | 1020 | 775 | — | — |
| 1690 | — | — | 1820 | 1350 | 985 | 740 | — | — |
| 2340 | 2010 | 1700 | 2690 | 2090 | 1600 | 1215 | 890 | 640 |
| 2320 | 2090 | 1860 | 2840 | 2340 | 1920 | 1550 | 1260 | 1000 |
| 2050 | 1840 | — | 2790 | 2270 | 1850 | 1490 | 1200 | — |
| 1990 | 1770 | 1580 | 2420 | 1930 | 1550 | 1220 | 965 | 770 |
| 1780 | 1550 | 1350 | 2500 | 1930 | 1480 | 1130 | 855 | 645 |
| 2120 | 1870 | 1640 | 3660 | 2870 | 2240 | 1750 | 1360 | 1040 |
| 1430 | — | — | 1930 | 1360 | 960 | 680 | — | — |
| 1410 | — | — | 1860 | 1350 | 1000 | 750 | — | — |
| 1410 | — | — | 1860 | 1350 | 1000 | 750 | — | — |

CIL Ballistics Table (Cont.)

| Description | Bullet | | Velocity (fps) | | |
|------------------------------|-------------|------|----------------|-------------|-------------|
| | Wt. Grs. | Type | Muzzle | 100 yds. | 200 yds. |
| 30-30 Winchester | 170 | MC | 2220 | 1890 | 1630 |
| 30-30 Winchester | 150 | ST | 2410 | 2020 | 1700 |
| 30 Remington | 170 | KKSP | 2120 | 1820 | 1560 |
| 30-40 Krag | 180 | KKSP | 2470 | 2120 | 1830 |
| 30-06 Springfield | 130 | HP | 3150 | 2730 | 2470 |
| 30-06 Springfield | 150 | PSP | 2970 | 2670 | 2400 |
| 30-06 Springfield | 150 | ST | 2970 | 2670 | 2400 |
| 30-06 Springfield | 180 | KKSP | 2700 | 2330 | 2010 |
| 30-06 Springfield | 180 | CPE | 2700 | 2480 | 2280 |
| 30-06 Springfield | 180 | ST | 2700 | 2470 | 2250 |
| 30-06 Springfield | 220 | KKSP | 2410 | 2120 | 1870 |
| 300 Winchester Magnum | 180 | ST | 3070 | 2850 | 2640 |
| 300 Holland & Holland Magnum | 180 | PSP | 2920 | 2670 | 2440 |
| 300 Savage | 150 | PSP | 2670 | 2390 | 2130 |
| 300 Savage | 150 | ST | 2670 | 2390 | 2130 |
| 300 Savage | 180 | KKSP | 2370 | 2040 | 1760 |
| 300 Savage | 180 | ST | 2370 | 2160 | 1960 |
| 303 Savage | 190 | KKSP | 1980 | 1680 | 1440 |
| 303 British | 150 | PSP | 2720 | 2420 | 2150 |
| 303 British | 150 | ST | 2720 | 2420 | 2150 |
| 303 British | 180 | KKSP | 2540 | 2180 | 1860 |
| 303 British | 180 | CPE | 2540 | 2330 | 2130 |
| 303 British | 180 | ST | 2540 | 2300 | 2090 |
| 303 British | 215 | KKSP | 2180 | 1900 | 1660 |
| 308 Winchester | 130 | HP | 2930 | 2590 | 2290 |
| 308 Winchester | 150 | PSP | 2860 | 2570 | 2300 |
| 308 Winchester | 150 | ST | 2860 | 2570 | 2300 |
| 308 Winchester | 180 | KKSP | 2610 | 2240 | 1920 |
| 308 Winchester | 180 | ST | 2610 | 2390 | 2170 |
| 308 Winchester | 200 | KKSP | 2450 | 2210 | 1980 |
| 8mm Mauser | 170 | PSP | 2570 | 2300 | 2040 |
| 32-20 Winchester | 115 | SP | 1480 | 1220 | 1050 |
| 32 Winchester Special | 170 | KKSP | 2280 | 1920 | 1630 |
| 32 Winchester Special | 170 | ST | 2280 | 1920 | 1630 |
| 32 Remington | 170 | KKSP | 2120 | 1800 | 1540 |
| 32-40 Winchester | 170 | KKSP | 1540 | 1340 | 1170 |
| 35 Remington | 200 | SP | 2100 | 1710 | 1390 |
| 351 Winchester Self-Loading | 180 | SP | 1850 | 1560 | 1310 |

| Velocity (fps) | | | Energy (ft. lbs.) | | | | | |
|----------------|-------------|-------------|-------------------|-------------|-------------|-------------|-------------|-------------|
| 300 yds. | 400 yds. | 500 yds. | Muzzle | 100 yds. | 200 yds. | 300 yds. | 400 yds. | 500 yds. |
| 1410 | — | — | 1860 | 1350 | 1000 | 750 | — | — |
| 1430 | — | — | 1930 | 1360 | 960 | 680 | — | — |
| 1350 | — | — | 1700 | 1250 | 920 | 690 | — | — |
| 1590 | 1400 | — | 2440 | 1790 | 1340 | 1010 | 785 | — |
| 2170 | 1920 | 1690 | 2870 | 2160 | 1770 | 1360 | 1060 | 820 |
| 2130 | 1890 | 1670 | 2930 | 2370 | 1920 | 1510 | 1190 | 930 |
| 2130 | 1890 | 1670 | 2930 | 2370 | 1920 | 1510 | 1190 | 930 |
| 1740 | 1520 | — | 2910 | 2170 | 1610 | 1210 | 920 | — |
| 2080 | 1900 | 1730 | 2910 | 2460 | 2080 | 1730 | 1440 | 1190 |
| 2040 | 1850 | 1670 | 2910 | 2440 | 2020 | 1660 | 1370 | 1110 |
| 1670 | 1480 | — | 2830 | 2190 | 1710 | 1360 | 1070 | — |
| 2440 | 2250 | 2060 | 3770 | 3250 | 2790 | 2380 | 2020 | 1700 |
| 2220 | 2020 | 1830 | 3400 | 2850 | 2380 | 1970 | 1630 | 1340 |
| 1890 | 1660 | — | 2370 | 1900 | 1510 | 1190 | 915 | — |
| 1890 | 1660 | — | 2370 | 1900 | 1510 | 1190 | 915 | — |
| 1520 | 1340 | — | 2240 | 1660 | 1240 | 920 | 715 | — |
| 1770 | 1600 | — | 2240 | 1860 | 1530 | 1250 | 1020 | — |
| 1250 | — | — | 1650 | 1190 | 875 | 660 | — | — |
| 1900 | 1670 | 1470 | 2460 | 1950 | 1540 | 1200 | 930 | 720 |
| 1900 | 1670 | 1470 | 2460 | 1950 | 1540 | 1200 | 930 | 720 |
| 1590 | 1360 | — | 2580 | 1900 | 1380 | 1010 | 740 | — |
| 1940 | 1760 | 1600 | 2580 | 2170 | 1810 | 1500 | 1240 | 1020 |
| 1900 | 1730 | 1580 | 2580 | 2120 | 1750 | 1440 | 1200 | 1000 |
| 1460 | 1250 | — | 2270 | 1720 | 1310 | 1020 | 750 | — |
| 2010 | 1770 | 1560 | 2480 | 1940 | 1520 | 1170 | 905 | 700 |
| 2050 | 1810 | 1590 | 2730 | 2200 | 1760 | 1400 | 1090 | 840 |
| 2050 | 1810 | 1590 | 2730 | 2200 | 1760 | 1400 | 1090 | 840 |
| 1640 | 1400 | — | 2720 | 2010 | 1470 | 1070 | 785 | — |
| 1970 | 1780 | 1600 | 2720 | 2280 | 1870 | 1540 | 1260 | 1010 |
| 1770 | 1580 | 1410 | 2670 | 2170 | 1750 | 1400 | 1110 | 875 |
| 1810 | 1600 | — | 2490 | 2000 | 1570 | 1240 | 965 | — |
| 940 | — | — | 560 | 380 | 280 | 225 | — | — |
| 1410 | — | — | 1960 | 1390 | 1000 | 750 | — | — |
| 1410 | — | — | 1960 | 1390 | 1000 | 750 | — | — |
| 1340 | — | — | 1700 | 1220 | 895 | 680 | — | — |
| 1050 | — | — | 895 | 680 | 515 | 415 | — | — |
| 1160 | — | — | 1950 | 1300 | 865 | 605 | — | — |
| 1140 | — | — | 1370 | 975 | 685 | 520 | — | — |

CIL Ballistics Table (Cont.)

| Description | Bullet | | Velocity (fps) | | |
|------------------------|-------------|------|----------------|-------------|-------------|
| | Wt. Grs. | Type | Muzzle | 100 yds. | 200 yds. |
| 358 (8.8mm) Winchester | 200 | KKSP | 2530 | 2210 | 1910 |
| 38-40 Winchester | 180 | SP | 1330 | 1070 | 960 |
| 38-55 Winchester | 255 | SP | 1600 | 1410 | 1240 |
| 43 (11mm) Mauser | 385 | LEAD | 1360 | 1150 | 1030 |
| 44-40 Winchester | 200 | SP | 1310 | 1050 | 940 |
| 44 Remington Magnum | 240 | SP | 1850 | 1450 | 1150 |

KKSP—'Kling-Kor' Soft Point PSP—Pointed Soft Point SP—Soft Point
 CPE—Copper Point Expanding MC—Metal Cased (Hard Point) PNEU—Pneu-
 matic HP—Hollow Point ST—'Sabretip'

CIL Range Table

RANGE TABLE—Values shown in this table are based on a sight height 1½" above line of bore. **RECOMMENDED SIGHTING:** ⊕ Indicates the most favorable

| Description | First Crosses Line of Sight | | | | |
|----------------------|-----------------------------|------------|------------|-------------|-------------|
| | app. yds. | 50 yds. | 75 yds. | 100 yds. | 125 yds. |
| 22 Hornet | 29.0 | — | +1.5 | — | — |
| 22 Savage | 25.0 | — | — | +2.0 | — |
| 222 Remington | 30.0 | — | — | +2.0 | — |
| 243 Winchester | 30.0 | — | — | — | +2.5 |
| 243 Winchester | 27.5 | — | — | — | +3.0 |
| 244 Remington | 30.0 | — | — | — | +2.5 |
| 6.5 x 53mm Man.-Sch. | 25.5 | — | +1.5 | — | — |
| 6.5 x 55mm | 21.0 | — | — | +3.5 | — |
| 25-20 Winchester | 16.0 | +2.0 | — | ⊕ | -4.0 |
| 25-35 Winchester | 23.0 | — | +1.5 | — | — |
| 250 Savage | 27.5 | — | — | +2.0 | — |
| 257 Roberts | 24.0 | — | — | +2.5 | — |
| 270 Winchester | 31.5 | — | — | — | +2.5 |
| 270 Winchester | 27.5 | — | — | — | +3.0 |
| 270 Winchester | 28.5 | — | — | +2.0 | — |

| Velocity (fps) | | | Energy (ft. lbs.) | | | | | |
|----------------|-------------|-------------|-------------------|-------------|-------------|-------------|-------------|-------------|
| 300 yds. | 400 yds. | 500 yds. | Muzzle | 100 yds. | 200 yds. | 300 yds. | 400 yds. | 500 yds. |
| 1640 | 1400 | — | 2840 | 2160 | 1610 | 1190 | 870 | — |
| 850 | — | — | 705 | 455 | 370 | 290 | — | — |
| 1110 | — | — | 1450 | 1130 | 880 | 700 | — | — |
| 940 | — | — | 1580 | 1130 | 910 | 750 | — | — |
| 830 | — | — | 760 | 490 | 390 | 305 | — | — |
| 980 | — | — | 1820 | 1120 | 710 | 510 | — | — |

sighting range in order to minimize the sighting problem at shorter and longer ranges. + Indicates inches high; — Indicates inches low.

| 150 yds. | 200 yds. | 250 yds. | 300 yds. | 400 yds. | 500 yds. | Bullet Wt. Grs. | Type |
|-------------|-------------|-------------|-------------|-------------|-------------|--------------------|------|
| ⊕ | —4.0 | — | — | — | — | 45 | PSP |
| — | ⊕ | —4.5 | — | — | — | 70 | PSP |
| — | ⊕ | —3.5 | — | — | — | 50 | PSP |
| — | — | ⊕ | —3.0 | —15.5 | —36.5 | 75 | PSP |
| — | — | ⊕ | —3.5 | —16.5 | —35.5 | 100 | PSP |
| — | — | ⊕ | —3.0 | —15.5 | —36.5 | 75 | PSP |
| ⊕ | —4.0 | — | — | — | — | 160 | SP |
| — | ⊕ | —5.0 | —13.0 | —39.0 | — | 160 | SP |
| — | — | — | — | — | — | 86 | SP |
| ⊕ | —4.5 | — | — | — | — | 117 | SP |
| — | ⊕ | —3.5 | — | — | — | 100 | PSP |
| — | ⊕ | —4.5 | — | — | — | 117 | PSP |
| — | — | ⊕ | —3.5 | —14.5 | —33.5 | 100 | PSP |
| — | — | ⊕ | —4.0 | —16.0 | —35.5 | 130 | PSP |
| — | ⊕ | —4.0 | — | —25.0 | — | 160 | KKSP |

CIL Range Table (Cont.)

| Description | First Crosses Line of Sight | | | | |
|------------------------------|--------------------------------------|------------|------------|-------------|-------------|
| | app. yds. | 50 yds. | 75 yds. | 100 yds. | 125 yds. |
| 7 x 57mm Mauser | 27.0 | — | — | — | +4.0 |
| 7 x 57mm Mauser | 29.0 | — | — | +2.5 | — |
| 7mm Remington Magnum | 25.0 | — | — | — | +3.5 |
| 30-30 Winchester | 27.0 | — | +1.5 | — | — |
| 30-30 Winchester | 23.0 | — | +1.5 | — | — |
| 30-30 Winchester | 23.0 | — | +1.5 | — | — |
| 30-30 Winchester | 23.0 | — | +1.5 | — | — |
| 30-30 Winchester | 27.0 | — | +1.5 | — | — |
| 30 Remington | 20.0 | — | +2.0 | — | — |
| 30-30 Krag | 21.0 | — | — | +3.0 | — |
| 30-06 Springfield | 27.0 | — | — | — | +3.0 |
| 30-06 Springfield | 25.0 | — | — | — | +3.5 |
| 30-06 Springfield | 25.0 | — | — | — | +3.5 |
| 30-06 Springfield | 24.0 | — | — | +2.5 | — |
| 30-06 Springfield | 21.0 | — | — | — | +4.0 |
| 30-06 Springfield | 20.0 | — | — | — | +4.0 |
| 30-06 Springfield | 21.0 | — | — | +3.0 | — |
| 300 Winchester Magnum | 27.5 | — | — | — | +3.0 |
| 300 Holland & Holland Magnum | 25.0 | — | — | — | +3.5 |
| 300 Savage | 26.0 | — | — | +2.5 | — |
| 300 Savage | 26.0 | — | — | +2.5 | — |
| 300 Savage | 20.0 | — | — | +3.5 | — |
| 300 Savage | 21.5 | — | — | +3.0 | — |
| 303 Savage | 17.5 | — | — | +3.0 | — |
| 303 British | 22.0 | — | — | — | +4.5 |
| 303 British | 22.0 | — | — | — | +4.5 |
| 303 British | 23.0 | — | — | +3.0 | — |
| 303 British | 19.0 | — | — | — | +4.5 |
| 303 British | 17.5 | — | — | — | +5.0 |
| 303 British | 16.0 | — | — | +4.5 | — |
| 308 Winchester | 23.5 | — | — | — | +3.5 |
| 308 Winchester | 25.0 | — | — | — | +3.5 |
| 308 Winchester | 25.0 | — | — | — | +3.5 |
| 308 Winchester | 23.0 | — | — | +3.0 | — |
| 308 Winchester | 22.0 | — | — | — | +4.5 |
| 308 Winchester | 22.0 | — | — | +3.0 | — |

| 150 yds. | 200 yds. | 250 yds. | 300 yds. | 400 yds. | 500 yds. | Bullet Wt. Grs. Type | |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------------------|------|
| — | — | ⊕ | —4.5 | —18.5 | —41.0 | 139 | PSP |
| — | ⊕ | —4.0 | — | —28.5 | — | 160 | KKSP |
| — | — | ⊕ | —4.0 | —18.0 | —43.0 | 175 | SP |
| ⊕ | —4.0 | — | — | — | — | 150 | PNEU |
| ⊕ | —4.5 | — | — | — | — | 170 | KKSP |
| ⊕ | —4.5 | — | — | — | — | 170 | ST |
| ⊕ | —4.5 | — | — | — | — | 170 | MC |
| ⊕ | —4.0 | — | — | — | — | 150 | ST |
| ⊕ | —5.0 | — | — | — | — | 170 | KKSP |
| — | ⊕ | —5.5 | — | —41.0 | — | 180 | KKSP |
| — | — | ⊕ | —4.0 | —19.5 | —47.0 | 130 | HP |
| — | — | ⊕ | —4.0 | —17.5 | —41.0 | 150 | PSP |
| — | — | ⊕ | —4.0 | —17.5 | —41.0 | 150 | ST |
| — | ⊕ | —4.0 | — | —32.5 | — | 180 | KKSP |
| — | — | ⊕ | —4.5 | —20.5 | —46.0 | 180 | CPE |
| — | — | ⊕ | —4.5 | —21.0 | —48.5 | 180 | ST |
| — | ⊕ | —5.5 | — | —41.0 | — | 220 | KKSP |
| — | — | ⊕ | —3.5 | —14.5 | —32.5 | 180 | ST |
| — | — | ⊕ | —4.0 | —17.5 | —39.0 | 180 | PSP |
| — | ⊕ | —3.5 | — | —29.0 | — | 150 | PSP |
| — | ⊕ | —3.5 | — | —29.0 | — | 150 | ST |
| — | ⊕ | —5.5 | — | —43.0 | — | 180 | KKSP |
| — | ⊕ | —5.5 | — | —35.0 | — | 180 | ST |
| — | ⊕ | —5.5 | — | — | — | 190 | KKSP |
| — | — | ⊕ | —5.0 | —23.0 | —53.5 | 150 | PSP |
| — | — | ⊕ | —5.0 | —23.0 | —53.5 | 150 | ST |
| — | ⊕ | —5.0 | — | —41.0 | — | 180 | KKSP |
| — | — | ⊕ | —5.0 | —23.0 | —52.5 | 180 | CPE |
| — | — | ⊕ | —5.5 | —26.5 | —71.0 | 180 | ST |
| — | ⊕ | —7.0 | — | —54.0 | — | 215 | KKSP |
| — | — | ⊕ | —4.5 | —23.5 | —59.0 | 130 | HP |
| — | — | ⊕ | —4.5 | —20.0 | —47.5 | 150 | PSP |
| — | — | ⊕ | —4.5 | —20.0 | —47.5 | 150 | ST |
| — | ⊕ | —5.5 | — | —38.0 | — | 180 | KKSP |
| — | — | ⊕ | —5.0 | —21.5 | —51.5 | 180 | ST |
| — | ⊕ | —5.0 | —12.0 | —35.0 | —48.5 | 200 | KKSP |

CIL Range Table (Cont.)

| Description | First Crosses Line of Sight | 50 yds. | 75 yds. | 100 yds. | 125 yds. |
|-----------------------------|--------------------------------------|------------|------------|-------------|-------------|
| | app. yds. | | | | |
| 8mm Mauser | 22.5 | — | — | +3.5 | — |
| 32-20 Winchester | 16.5 | +2.0 | — | ⊕ | -3.5 |
| 32 Winchester Special | 23.0 | — | +2.0 | — | — |
| 32 Winchester Special | 23.0 | — | +2.0 | — | — |
| 32 Remington | 20.0 | — | +2.0 | — | — |
| 32-40 Winchester | 21.0 | +1.0 | — | ⊕ | -2.5 |
| 35 Remington | 19.5 | — | +2.5 | — | — |
| 351 Winchester Self-Loading | 16.0 | — | +3.0 | — | — |
| 358 (8.8mm) Winchester | 20.5 | — | — | +3.0 | — |
| 38-40 Winchester | 14.5 | +2.5 | — | ⊕ | -4.0 |
| 38-55 Winchester | 13.5 | — | +4.0 | — | — |
| 43 (11mm) Mauser | 16.0 | +2.0 | — | ⊕ | -3.5 |
| 44-40 Winchester | 12.5 | +3.0 | — | ⊕ | -4.5 |
| 44 Remington Magnum | 13.0 | — | +4.5 | — | — |

Short Range Sighting-in—It is preferable to sight-in a rifle at the "recommended sighting" range. However, it is sometimes necessary to sight-in a rifle at a distance shorter than the "recommended sighting" range because you don't have the necessary yardage available. To do this, find from the range table at what distance the bullet will first cross the line of sight. Put up a target at this distance and from a firm rest fire a three-shot group. The center point of the group

Rimfire Cartridges

Remington-Peters, Winchester-Western, Federal & CCI

| Cartridge | Bullet Wt. Grs. Type | | Velocity (fps) | |
|--------------------------------|-------------------------|-------|----------------|----------|
| | | | Muzzle | 100 yds. |
| .22 Short T22 (b) | 29 | C, L* | 1045 | 810 |
| .22 Short Hi-Vel. | 29 | C, L | 1125 | 920 |
| .22 Short HP Hi-Vel. (a, b, c) | 27 | C, L | 1155 | 920 |
| .22 Short (a, c) | 29 | D | 1045 | — |
| .22 Short (a, c) | 15 | D | 1710 | — |
| .22 Long Hi-Vel. (a, c) | 29 | C, L | 1240 | 965 |
| .22 Long Rifle T22 (b)†2 | 40 | L* | 1145 | 975 |

| 150 yds. | 200 yds. | 250 yds. | 300 yds. | 400 yds. | 500 yds. | Bullet Wt. Grs. Type | |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------------------|------|
| — | ⊕ | —5.5 | — | —33.5 | — | 170 | PSP |
| — | — | — | — | — | — | 115 | SP |
| ⊕ | —4.5 | — | — | — | — | 170 | KKSP |
| ⊕ | —4.5 | — | — | — | — | 170 | ST |
| ⊕ | —5.0 | — | — | — | — | 170 | KKSP |
| — | — | — | — | — | — | 170 | KKSP |
| ⊕ | —6.0 | — | — | — | — | 200 | SP |
| ⊕ | —7.5 | — | — | — | — | 180 | SP |
| — | ⊕ | —5.0 | — | —38.5 | — | 200 | KKSP |
| — | — | — | — | — | — | 180 | SP |
| ⊕ | —8.5 | — | — | — | — | 255 | SP |
| — | — | — | — | — | — | 385 | LEAD |
| — | — | — | — | — | — | 200 | SP |
| ⊕ | —8.0 | — | — | — | — | 240 | SP |

is the "center of impact"—the average spot where the bullets strike. Adjust sights to bring the center of impact to the center of the target then fire another group. If the center of impact is on target the rifle will be sighted in at the range recommended in the range table. It is, however, desirable to fire a target at that range as soon as possible as a double check.

| Energy (ft. lbs.) | | Mid-Range Trajectory | Handgun Barrel | Ballistics | ME |
|-------------------|----------|-------------------------|-------------------|------------|----|
| Muzzle | 100 yds. | 100 yds. | Length | MV FPS | FP |
| 70 | 42 | 5.6 | 6" | 865 | 48 |
| 81 | 54 | 4.3 | 6" | 1035 | 69 |
| 80 | 51 | 4.2 | — | — | — |
| 70 | — | — | — | — | — |
| 97 | — | — | — | — | — |
| 99 | 60 | 3.8 | 6" | 1095 | 77 |
| 116 | 84 | 4.0 | 6" | 950 | 80 |

Rimfire Cartridges (Cont.)

| Cartridge | Bullet Wt. Grs. Type | | Velocity (fps) | |
|----------------------------------|-------------------------|---------|----------------|----------|
| | | | Muzzle | 100 yds. |
| .22 Long Rifle (b)†1 | 40 | L* | 1120 | 950 |
| .22 Long Rifle (b)†3 | 40 | L* | — | — |
| .22 Long Rifle (d)†4 | 40 | C | 1165 | 980 |
| .22 Long Rifle Hi-Vel. | 40 | C, L | 1285 | 1025 |
| .22 Long Rifle HP Hi-Vel. (b, d) | 37 | C, L | 1315 | 1020 |
| .22 Long Rifle HP Hi-Vel. (a, c) | 36 | C | 1365 | 1040 |
| .22 Long Rifle (a, b, c) | No. | 12 Shot | — | — |
| .22 WRF [Rem. Spl.] (a, b) | 45 | C, L | 1450 | 1110 |
| .22 WRF Mag. (b) | 40 | JHP | 2000 | 1390 |
| .22 WRF Mag. (b) | 40 | MC | 2000 | 1390 |
| .22 Win. Auto Inside lub. (a) | 45 | C, L | 1055 | 930 |
| 5mm Rem. RFM (a) | 38 | PLHP | 2100 | 1605 |

†—Target loads of these ballistics available in: (1) Rem. Match; (2) W-W Super Match Mark III; (3) Super Match Mark IV and Pistol Match; (4) CCI Mini-Group.
C—Copper plated L—Lead (Wax Coated) L*—Lead, lubricated D—Disin-

RWS Rimfire Cartridges

| No. | Cartridge | Bullet Type | Wt. gr. | Max. per- missible breach pressure lbs./sq. in. | Barrel Length inches | Velocity (fps) | | |
|-------|----------------------|----------------------------------|------------|-------------------------------------------------------------------|----------------------------|----------------|------------|-------------|
| | | | | | | Muzzle | 50 yds. | 100 yds. |
| 15400 | .22 I.r. Standard | lead bullet lubricated | 39 | 18500 | 25.5 | 1080 | 980 | 900 |
| 15404 | .22 I.r. R50 | | | | | | | |
| 15402 | .22 I.r. HV Solid | lead bullet copper- plated | 39 | 18500 | 25.5 | 1310 | 1105 | 985 |

| Energy (ft. lbs.) | | Mid-Range Trajectory 100 yds. | Handgun Barrel Length | Ballistics | |
|-------------------|----------|-------------------------------------|-----------------------------|------------|----------|
| Muzzle | 100 yds. | | | MV FPS | ME FP |
| 111 | 80 | 4.2 | — | — | — |
| — | — | — | 6¼" | 1060 | 100 |
| 121 | 84 | 4.0 | — | — | — |
| 147 | 93 | 3.4 | 6" | 1125 | 112 |
| 142 | 85 | 3.4 | — | — | — |
| 149 | 86 | 3.4 | — | — | — |
| — | — | — | — | — | — |
| 210 | 123 | 2.7 | — | — | — |
| 355 | 170 | 1.6 | 6½" | 1550 | 213 |
| 355 | 170 | 1.6 | 6½" | 1550 | 213 |
| 111 | 86 | — | — | — | — |
| 372 | 217 | — | Not Available | — | — |

Integrating MC—Metal Case HP—Hollow Point JHP—Jacket Hollow Point
PLHP—Power-Lokt Hollow Point.

all loads available from all manufacturers except as indicated: R-P (a); W-W (b);
ed. (c); CCI (d).

| Energy (ft. lbs.) | | | PATH OF BULLET ABOVE (+) OR BELOW (—) LINE OF SIGHT IN INCHES | | | | | | | |
|-------------------|-----|----|----------------------------------------------------------------------|------------|------------|-------------|--------------------------------------------------------------------------|------------|------------|-------------|
| | | | Iron sights based on a sight height of 0.8" above line of bore | | | | Telescopic sights based on a sight height of 2" above line of bore | | | |
| | | | 25 yds. | 50 yds. | 75 yds. | 100 yds. | 25 yds. | 50 yds. | 75 yds. | 100 yds. |
| 101 | 83 | 71 | +0.6 | ⊕ | —2.9 | —7.8 | —0.1 | ⊕ | —2.3 | —6.6 |
| | | | +1.5 | +1.9 | ⊕ | —4.0 | +0.7 | +1.5 | ⊕ | —3.6 |
| | | | +2.5 | +3.9 | +3.0 | ⊕ | +1.6 | +3.3 | +2.7 | ⊕ |
| 149 | 106 | 84 | +0.3 | ⊕ | —1.9 | —6.1 | —0.3 | ⊕ | —1.3 | —4.9 |
| | | | +0.9 | +1.3 | ⊕ | —3.6 | +0.1 | +0.9 | ⊕ | —3.2 |
| | | | +1.8 | +3.1 | +2.7 | ⊕ | +0.9 | +2.5 | +2.4 | ⊕ |

RWS Rimfire Cartridges (Cont.)

| No. | Cartridge | Bullet Type | Wt. gr. | Max. permissible breech pressure lbs./sq. in. | Barrel Length inches | Velocity (fps) | | |
|-------|--------------------------|----------------------------------------|---------|-----------------------------------------------|----------------------|----------------|---------|----------|
| | | | | | | Muzzle | 50 yds. | 100 yds. |
| 15403 | .22 l.r. HV Hollow Point | hollow-point lead bullet copper-plated | 35 | 18500 | 25.5 | 1340 | 1115 | 975 |
| 15420 | .22 short | lead bullet lubricated | 28 | 11400 | 25.5 | 920 | 845 | 775 |
| 15435 | .22 short automatic | lead bullet lubricated | 28 | 11400 | 25.5 | 970 | 885 | 815 |

.22 Long Rifle Rimfire Range Tables

Long Rifle Standard Velocity (1145 fps)

| 50 ft. | 50 yds. | 75 yds. | 100 yds. | 125 yds. | 150 yds. | 175 yds. | 200 yds. | First cross-ing point yds. |
|--------|---------|---------|----------|----------|----------|----------|----------|----------------------------|
| -1/8 | ⊕ | - 2.0 | - 6.5 | -13.7 | -23.5 | -40.0 | -57.0 | 28.0 |
| ⊕ | + 1.5 | ⊕ | - 3.6 | - 9.8 | -18.6 | -32.5 | -47.0 | 17.0 |
| + .7 | + 3.3 | + 2.8 | ⊕ | - 5.0 | -12.3 | -24.5 | -36.0 | 10.5 |
| +1.4 | + 5.2 | + 5.6 | + 3.8 | ⊕ | - 6.0 | -16.5 | -27.0 | 9.0 |
| +2.1 | + 7.3 | + 8.5 | + 7.7 | + 4.8 | ⊕ | - 8.0 | -18.0 | 7.0 |
| +3.0 | + 9.6 | +12.0 | +12.0 | +10.0 | + 6.5 | ⊕ | - 9.5 | 5.5 |
| +3.8 | +11.7 | +14.8 | +15.6 | +14.6 | +12.2 | + 7.8 | ⊕ | 4.8 |

| Energy (ft. lbs.) 50 100 Muzzle yds. yds. | | | PATH OF BULLET ABOVE (+) OR BELOW (—) LINE OF SIGHT IN INCHES | | | | | | | |
|-------------------------------------------------|----|----|----------------------------------------------------------------------|------|------|-------|--------------------------------------------------------------------------|------|------|------|
| | | | Iron sights based on a sight height of 0.8" above line of bore | | | | Telescopic sights based on a sight height of 2" above line of bore | | | |
| | | | 25 | 50 | 75 | 100 | 25 | 50 | 75 | 100 |
| | | | yds. | yds. | yds. | yds. | yds. | yds. | yds. | yds. |
| 140 | 97 | 74 | +0.4 | ⊕ | —1.9 | —6.0 | —0.2 | ⊕ | —1.3 | —4.8 |
| | | | +1.0 | +1.3 | ⊕ | —3.5 | +0.2 | +0.9 | ⊕ | —3.1 |
| | | | +1.9 | +3.0 | +2.6 | ⊕ | +1.0 | +2.4 | +2.3 | ⊕ |
| 52 | 44 | 37 | +1.1 | ⊕ | —4.2 | —12.1 | | | | |
| | | | +2.5 | +2.7 | ⊕ | —6.5 | | | | |
| 59 | 49 | 41 | +0.6 | ⊕ | —3.1 | —9.7 | | | | |
| | | | +1.6 | +2.1 | ⊕ | —5.5 | | | | |

.22 Long Rifle Rimfire Range Tables (Cont.)

| Long Rifle High Velocity (1365 fps) | | | | | | | | | |
|-------------------------------------|---------|---------|----------|----------|----------|----------|----------|--------------------------------------|--|
| 50 ft. | 50 yds. | 75 yds. | 100 yds. | 125 yds. | 150 yds. | 175 yds. | 200 yds. | First cross- ing point yds. | |
| — .5 | ⊕ | — .8 | — 3.5 | — 8.0 | —14.0 | —24.5 | —39.5 | 35.0 | |
| — .3 | + .6 | ⊕ | — 2.2 | — 6.0 | —11.5 | —21.5 | —35.0 | 25.0 | |
| ⊕ | + 1.6 | + 1.6 | ⊕ | — 3.1 | — 8.2 | —16.7 | —29.5 | 17.0 | |
| + .5 | + 3.0 | + 3.5 | + 2.5 | ⊕ | — 4.4 | —12.0 | —23.0 | 13.0 | |
| + .8 | + 4.3 | + 5.6 | + 5.2 | + 3.5 | ⊕ | — 6.5 | —16.0 | 10.5 | |
| +1.5 | + 6.3 | + 8.5 | + 9.0 | + 8.0 | + 5.2 | ⊕ | — 8.2 | 8.0 | |
| +2.2 | + 8.5 | +11.5 | +12.8 | +12.8 | +11.0 | + 6.8 | ⊕ | 7.0 | |

The .22 Long Rifle high velocity hollow-point (37-grain bullet) has very nearly the same center of impact as .22 Long Rifle high velocity (40-grain bullet).

Table of Bullet Energies

This table of energies has been worked out by application of the existing formula for computing energy and gives the foot-pounds of striking energy for one grain of bullet weight. The formula for using this table is simple: multiply the foot-pounds opposite the desired velocity by the weight of your bullet. Velocities have been carefully worked out for each increasing ten foot-seconds. For example, to obtain the energy of a 145-grain bullet at 2835 f.s. locate 2830 f.s. in the proper column and you find the energy to be 17.78 foot-pounds. The next figure is for 2480 f.s. and runs 17.91. Difference, .13 foot-pounds. Halve this and get .06, which, added to 17.78, gives 17.84. To get bullet energy, multiply 17.84 by 145 grains, and the figure is 2586.8 or 2587 foot-pounds. Use of this table saves much time in figuring muzzle or remaining energy of bullets.

| Velocity in fps | Energy | Velocity in fps | Energy | Velocity in fps | Energy |
|--------------------|--------|--------------------|--------|--------------------|--------|
| 600 | .80 | 840 | 1.56 | 1080 | 2.59 |
| 610 | .82 | 850 | 1.60 | 1090 | 2.63 |
| 620 | .85 | 860 | 1.64 | 1100 | 2.68 |
| 630 | .88 | 870 | 1.68 | 1110 | 2.73 |
| 640 | .91 | 880 | 1.72 | 1120 | 2.78 |
| 650 | .94 | 890 | 1.76 | 1130 | 2.83 |
| 660 | .96 | 900 | 1.79 | 1140 | 2.88 |
| 670 | .99 | 910 | 1.83 | 1150 | 2.93 |
| 680 | 1.02 | 920 | 1.87 | 1160 | 2.99 |
| 690 | 1.05 | 930 | 1.92 | 1170 | 3.04 |
| 700 | 1.08 | 940 | 1.96 | 1180 | 3.09 |
| 710 | 1.11 | 950 | 2.00 | 1190 | 3.14 |
| 720 | 1.15 | 960 | 2.04 | 1200 | 3.19 |
| 730 | 1.18 | 970 | 2.08 | 1210 | 3.25 |
| 740 | 1.21 | 980 | 2.13 | 1220 | 3.30 |
| 750 | 1.24 | 990 | 2.17 | 1230 | 3.36 |
| 760 | 1.28 | 1000 | 2.22 | 1240 | 3.41 |
| 770 | 1.31 | 1010 | 2.26 | 1250 | 3.47 |
| 780 | 1.34 | 1020 | 2.31 | 1260 | 3.52 |
| 790 | 1.38 | 1030 | 2.35 | 1270 | 3.58 |
| 800 | 1.42 | 1040 | 2.40 | 1280 | 3.63 |
| 810 | 1.45 | 1050 | 2.45 | 1290 | 3.69 |
| 820 | 1.49 | 1060 | 2.49 | 1300 | 3.75 |
| 830 | 1.53 | 1070 | 2.54 | 1310 | 3.81 |

Table of Bullet Energies (Cont.)

| Velocity in fps | Energy | Velocity in fps | Energy | Velocity in fps | Energy |
|----------------------------|---------------|----------------------------|---------------|----------------------------|---------------|
| 1320 | 3.86 | 1720 | 6.57 | 2120 | 9.98 |
| 1330 | 3.92 | 1730 | 6.64 | 2130 | 10.07 |
| 1340 | 3.98 | 1740 | 6.72 | 2140 | 10.17 |
| 1350 | 4.04 | 1750 | 6.80 | 2150 | 10.26 |
| 1360 | 4.10 | 1760 | 6.88 | 2160 | 10.36 |
| 1370 | 4.16 | 1770 | 6.95 | 2170 | 10.45 |
| 1380 | 4.22 | 1780 | 7.03 | 2180 | 10.55 |
| 1390 | 4.29 | 1790 | 7.11 | 2190 | 10.65 |
| 1400 | 4.35 | 1800 | 7.19 | 2200 | 10.74 |
| 1410 | 4.41 | 1810 | 7.27 | 2210 | 10.84 |
| 1420 | 4.47 | 1820 | 7.35 | 2220 | 10.94 |
| 1430 | 4.54 | 1830 | 7.43 | 2230 | 11.04 |
| 1440 | 4.60 | 1840 | 7.51 | 2240 | 11.14 |
| 1450 | 4.66 | 1850 | 7.60 | 2250 | 11.24 |
| 1460 | 4.73 | 1860 | 7.68 | 2260 | 11.34 |
| 1470 | 4.79 | 1870 | 7.76 | 2270 | 11.44 |
| 1480 | 4.86 | 1880 | 7.84 | 2280 | 11.54 |
| 1490 | 4.93 | 1890 | 7.94 | 2290 | 11.64 |
| 1500 | 5.00 | 1900 | 8.01 | 2300 | 11.74 |
| 1510 | 5.06 | 1910 | 8.10 | 2310 | 11.83 |
| 1520 | 5.13 | 1920 | 8.18 | 2320 | 11.95 |
| 1530 | 5.19 | 1930 | 8.37 | 2330 | 12.05 |
| 1540 | 5.26 | 1940 | 8.35 | 2340 | 12.16 |
| 1550 | 5.33 | 1950 | 8.44 | 2350 | 12.26 |
| 1560 | 5.40 | 1960 | 8.53 | 2360 | 12.37 |
| 1570 | 5.47 | 1970 | 8.61 | 2370 | 12.47 |
| 1580 | 5.54 | 1980 | 8.70 | 2380 | 12.58 |
| 1590 | 5.61 | 1990 | 8.79 | 2390 | 12.68 |
| 1600 | 5.68 | 2000 | 8.88 | 2400 | 12.78 |
| 1610 | 5.75 | 2010 | 8.97 | 2410 | 12.90 |
| 1620 | 5.82 | 2020 | 9.06 | 2420 | 13.00 |
| 1630 | 5.90 | 2030 | 9.15 | 2430 | 13.11 |
| 1640 | 5.97 | 2040 | 9.24 | 2440 | 13.22 |
| 1650 | 6.04 | 2050 | 9.33 | 2450 | 13.33 |
| 1660 | 6.12 | 2060 | 9.42 | 2460 | 13.44 |
| 1670 | 6.19 | 2070 | 9.50 | 2470 | 13.55 |
| 1680 | 6.26 | 2080 | 9.60 | 2480 | 13.66 |
| 1690 | 6.34 | 2090 | 9.70 | 2490 | 13.77 |
| 1700 | 6.41 | 2100 | 9.80 | 2500 | 13.88 |
| 1710 | 6.49 | 2110 | 9.90 | 2510 | 13.99 |

Table of Bullet Energies (Cont.)

| Velocity in fps | Energy | Velocity in fps | Energy | Velocity in fps | Energy |
|--------------------|--------|--------------------|--------|--------------------|--------|
| 2520 | 14.10 | 2920 | 18.93 | 3320 | 24.43 |
| 2530 | 14.20 | 2930 | 19.06 | 3330 | 24.58 |
| 2540 | 14.32 | 2940 | 19.19 | 3340 | 24.73 |
| 2550 | 14.44 | 2950 | 19.32 | 3350 | 24.87 |
| 2560 | 14.55 | 2960 | 19.45 | 3360 | 25.02 |
| 2570 | 14.67 | 2970 | 19.59 | 3370 | 25.17 |
| 2580 | 14.78 | 2980 | 19.72 | 3380 | 25.32 |
| 2590 | 14.89 | 2990 | 19.85 | 3390 | 25.47 |
| 2600 | 15.01 | 3000 | 20.00 | 3400 | 25.62 |
| 2610 | 15.13 | 3010 | 20.12 | 3410 | 25.77 |
| 2620 | 15.24 | 3020 | 20.25 | 3420 | 25.93 |
| 2630 | 15.36 | 3030 | 20.39 | 3430 | 26.08 |
| 2640 | 15.48 | 3040 | 20.52 | 3440 | 26.23 |
| 2650 | 15.59 | 3050 | 20.66 | 3450 | 26.38 |
| 2660 | 15.71 | 3060 | 20.79 | 3460 | 26.54 |
| 2670 | 15.83 | 3070 | 20.93 | 3470 | 26.69 |
| 2680 | 15.96 | 3080 | 21.07 | 3480 | 26.85 |
| 2690 | 16.07 | 3090 | 21.16 | 3490 | 27.00 |
| 2700 | 16.19 | 3100 | 21.29 | 3500 | 27.16 |
| 2710 | 16.31 | 3110 | 21.43 | 3510 | 27.31 |
| 2720 | 16.43 | 3120 | 21.57 | 3520 | 27.47 |
| 2730 | 16.55 | 3130 | 21.71 | 3530 | 27.62 |
| 2740 | 16.67 | 3140 | 21.85 | 3540 | 27.78 |
| 2750 | 16.79 | 3150 | 21.99 | 3550 | 27.94 |
| 2760 | 16.91 | 3160 | 22.12 | 3560 | 28.10 |
| 2770 | 17.04 | 3170 | 22.26 | 3570 | 28.25 |
| 2780 | 17.16 | 3180 | 22.41 | 3580 | 28.41 |
| 2790 | 17.28 | 3190 | 22.55 | 3590 | 28.57 |
| 2800 | 17.41 | 3200 | 22.69 | 3600 | 28.73 |
| 2810 | 17.53 | 3210 | 22.83 | 3610 | 28.94 |
| 2820 | 17.66 | 3220 | 22.97 | 3620 | 29.10 |
| 2830 | 17.78 | 3230 | 23.12 | 3630 | 29.26 |
| 2840 | 17.91 | 3240 | 23.26 | 3640 | 29.42 |
| 2850 | 18.04 | 3250 | 23.41 | 3650 | 29.58 |
| 2860 | 18.16 | 3260 | 23.55 | 3660 | 29.75 |
| 2870 | 18.29 | 3270 | 23.70 | 3670 | 29.91 |
| 2880 | 18.42 | 3280 | 23.84 | 3680 | 30.07 |
| 2890 | 18.55 | 3290 | 23.99 | 3690 | 30.24 |
| 2900 | 18.67 | 3300 | 24.14 | 3700 | 30.40 |
| 2910 | 18.80 | 3310 | 24.28 | 3710 | 30.56 |

Table of Bullet Energies (Cont.)

| Velocity in fps | Energy | Velocity in fps | Energy | Velocity in fps | Energy |
|--------------------|--------|--------------------|--------|--------------------|--------|
| 3720 | 30.73 | 4020 | 35.89 | 4320 | 41.45 |
| 3730 | 30.90 | 4030 | 36.07 | 4330 | 41.64 |
| 3740 | 31.06 | 4040 | 36.25 | 4340 | 41.83 |
| 3750 | 31.23 | 4050 | 36.43 | 4350 | 42.02 |
| 3760 | 31.40 | 4060 | 36.61 | 4360 | 42.22 |
| 3770 | 31.56 | 4070 | 36.79 | 4370 | 42.41 |
| 3780 | 31.73 | 4080 | 36.97 | 4380 | 42.61 |
| 3790 | 31.90 | 4090 | 37.15 | 4390 | 42.80 |
| 3800 | 32.07 | 4100 | 37.33 | 4400 | 43.00 |
| 3810 | 32.24 | 4110 | 37.51 | 4410 | 43.19 |
| 3820 | 32.41 | 4120 | 37.70 | 4420 | 43.39 |
| 3830 | 32.58 | 4130 | 37.88 | 4430 | 43.58 |
| 3840 | 32.75 | 4140 | 38.06 | 4440 | 43.78 |
| 3850 | 32.92 | 4150 | 38.25 | 4450 | 43.98 |
| 3860 | 33.09 | 4160 | 38.43 | 4460 | 44.18 |
| 3870 | 33.26 | 4170 | 38.62 | 4470 | 44.38 |
| 3880 | 33.45 | 4180 | 38.80 | 4480 | 44.58 |
| 3890 | 33.62 | 4190 | 38.99 | 4490 | 44.77 |
| 3900 | 33.78 | 4200 | 39.18 | 4500 | 44.97 |
| 3910 | 33.95 | 4210 | 39.36 | 4510 | 45.17 |
| 3920 | 34.12 | 4220 | 39.55 | 4520 | 45.37 |
| 3930 | 34.30 | 4230 | 39.74 | 4530 | 45.58 |
| 3940 | 34.48 | 4240 | 39.92 | 4540 | 45.78 |
| 3950 | 34.65 | 4250 | 40.11 | 4550 | 45.98 |
| 3960 | 34.82 | 4260 | 40.30 | 4560 | 46.18 |
| 3970 | 35.00 | 4270 | 40.49 | 4570 | 46.38 |
| 3980 | 35.18 | 4280 | 40.68 | 4580 | 46.59 |
| 3990 | 35.36 | 4290 | 40.87 | 4590 | 46.79 |
| 4000 | 35.53 | 4300 | 41.06 | | |
| 4010 | 35.71 | 4310 | 41.25 | | |

Caliber, Cartridge, and Bullet Recommendations

Small Game, Pests—Short-Range Shooting

.22 Short High-Velocity. 29 grains. Up to 50 yards. Only for snakes, rats, smallest pests.

.22 Short High-Velocity Hollow Point. 27 grains. Up to 50 yards for smallest pests. Recommended over rounded-nose bullets for hunting.

.22 Long High-Velocity. 29 grains. Up to about 60 yards, only for smallest pests.

.22 Long Rifle. 40 grains. Up to about 75 yards. For smallest game and pests such as squirrels, crows, and rats.

.22 Long Rifle High-Velocity. 40 grains. Up to about 75 yards for smallest game and pests, such as squirrels, crows, and rats.

.22 Long Rifle High-Velocity Hollow Point. 36 or 37 grains. Up to about 75 yards for small game such as squirrels, rabbits, and raccoon, and for game birds like ruffed grouse. Also for pests like crows, snapping turtles, and so on.

.22 Winchester Automatic. 45 grains. Up to about 75 yards for smallest game and pests such as squirrels, crows, and rats.

.22 WRF (Remington Special). 45 grains. Excellent for small game, such as squirrels and rabbits, and for various small pests. Good up to 100 yards.

.22 WMR. 40 grains with jacket hollow point best for hunting. Excellent up to 125 yards for rab-

bits, jackrabbits, ground squirrels, chucks, and other small game and varmints.

5mm Remington Rimfire Magnum. 38 grains. Excellent up to 150 yards for rabbits, jackrabbits, ground squirrels, chucks, and other small and medium game and varmints.

Varmints—Long-Range Shooting

.17 Remington. 25 grains. A light load for use up to 250 yards. Poor performance in wind.

5mm Remington Rimfire Magnum. See description under Short Range.

.22 WMR. See description under Short Range.

.218 Bee. 46 grains. Useful up to 200 yards.

.22 Hornet. 45 or 46 grains. Hollow point best. Use up to 175 yards.

.222 Remington. 50 grains. Up to 225 yards.

.222 Remington Magnum. 55 grains. Up to 250 yards. One of the best.

.22/250 Remington. 55 grains. Up to 300 yards. The most powerful, flattest-trajectory .22 caliber for which guns are made.

.220 Swift. 48 or 50 grains. Up to 350 yards.

.22 Savage Hi-Power. 70 grains. Up to 250 yards for large varmints.

.223 Remington. 55 grains. Up to 250 yards. Similar to .222 Remington Magnum.

.224 Weatherby Magnum (Varmintmaster). 55-grain bullet only recommended because of flatter trajectory. Up to 300 yards.

.225 Winchester. 55-grain bullet. Up to 300 yards. Comparable to .224 Weatherby Magnum.

.240 Weatherby Magnum. 70 grains for smaller varmints at longest distances. Up to 350 yards. 90 grains for larger varmints, up to 300 yards.

.243 Winchester. 80 grains. Up to 300 yards.

.244 Remington or 6mm Remington. Use 80 grains. Up to 300 yards. For larger varmints.

.25/06 Remington. Use 87 grains. Up to 300 yards.

.250 Savage. Use 87 grains. Up to 250 yards.

.257 Roberts. Use 87 grains. Up to 250 yards.

.257 Weatherby Magnum. Use 87 grains. Up to 300 yards. Most powerful .25 caliber.

Obviously, larger calibers with flat trajectories, such as the 6.5 Remington Magnum (with 100 grains), the .264 Winchester Magnum (100 grains), the .270 Winchester (with 100 grains), the .270 Weatherby Magnum (with 100 grains), and even the 7mm Mauser (with 103 grains) are more than adequate for larger varmints and predators. This is more fire-power than is needed for varmints, however, so these calibers have not been recommended here. However, owners of such guns can use them on larger varmints and predators with telling effect.

Antelope, Mountain Sheep, and Goats

Since these animals are hard to reach and are usually shot at the longest ranges, the best cartridges are those shooting bullets 100-150 grains with the flattest trajectories and the greatest accuracy. These include the following:

.240 Weatherby Magnum. 100 grains. Up to 350 yards.

.243 Winchester. 100 grains. Up to 310 yards.

6mm Remington. 100 grains. Up to 325 yards.

.25/06. 100 or 120 grains. Up to 300 yards.

.257 Weatherby. 100 or 117 grains. 117 grains up to 300 yards, and 100 grains up to 350 yards.

6.5 Remington Magnum. 100 or 120 grains. Up to 300 yards.

.264 Winchester Magnum. 100 or 140 grains. Up to 350 yards.

.270 Winchester. 100 or 130 grains. Up to 325 yards.

.270 Weatherby Magnum. 130 or 150 grains. Up to 350 yards.

.280 Remington. 150 grains. Up to 300 yards.

.284 Winchester. 125 or 150 grains. Up to 325 yards.

7mm Remington Magnum. 125 or 150 grains. Up to 350 yards.

7mm Weatherby Magnum. 139 or 154 grains. Up to 350 yards.

.30/06 Springfield. 125 or 150 grains. Up to 325 yards.

.300 Winchester Magnum. 150 grains. Up to 350 yards.

.300 H&H Magnum. 150 grains. Up to 400 yards.

.300 Weatherby Magnum. 150 grains. Up to 400 yards.

.308 Winchester 125 or 150 grains. Up to 300 yards.

Deer, Black Bear—Brush and Woods Shooting

The ideal woods cartridge has a fairly slow-moving, heavy bullet (150 grains or over), which will plow through brush with a minimum of deflection and a maximum of energy. Ranges are usually short, so the hunter does not need to be concerned about trajectory at long distances. There are some cartridges that are adequate for these purposes for deer but may be slightly on the light side for maximum stopping power for black bear, even though they may have been used many times to kill bear. These somewhat weaker loads are listed separately as brush-shooting deer loads. In addition, some cartridges will serve adequately as brush guns (the heavier-weight bullets should be used in the brush) but will also reach out to distances of 200 yards or better when the occasion demands (for this purpose, the lighter bullets should be selected). Those that can be used for these farther distances, as well as short, are marked with an asterisk (*).

Deer Only—not quite heavy enough for black bear

.30 Remington. 170 grains.

.30/30. 150, 170 grains.

.303 Savage. 180 grains.

.303 British. 180 grains.

.32 Remington. 170 grains

.32 Winchester Special. 170 grains.

.35 Remington. 150, 200 grains.

.38/55 Winchester. 255 grains.

Deer and Bear

- *.270 Winchester. 150 grains.
- *.280 Remington. 150, 165 grains.
- 7mm Mauser. 150, 175 grains.
- *.300 Savage. 150, 180 grains.
- *.30/40 Krag. 180, 220 grains.
- *.30/06. 150, 180, 220 grains.
- *.308. 150, 180, 200 grains.
- 8mm Mauser. 170 grains.
- *.348 Winchester. 200 grains.
- *.358 Winchester. 200, 250 grains.

Deer—Open Country, Long-Range Shooting

This type of hunting is common in the West, especially for mule deer. It involves long ranges, flat trajectories, and sufficient power to down large deer. Bullets selected should expand rapidly, since deer are a thin-skinned animal. The foot-pounds of energy delivered at 300 yards are listed to give a comparison.

*Foot-Pounds
at 300 Yards*

| | |
|------------------------------------------------|--------------|
| .240 Weatherby. 100 grains | 1,495 |
| .243 Winchester. 100 grains | 1,190 |
| 6mm Remington. 100 grains | 1,300 |
| .25/06. 120 grains | 1,480 |
| .257 Weatherby. 100 or 117 grains | 1,338, 1,315 |
| 6.5 Remington Magnum. 120 grains | 1,330 |
| .270 Winchester. 130 grains | 1,550, 1,660 |

*Foot-Pounds
at 300 Yards*

| | |
|--------------------------------------------------|------------------------|
| .280 Remington. 150 grains | 1,640 |
| .284 Winchester. 150 grains | 1,550 |
| .30/06 Springfield. 125, 150 grains | 1,340, 1,510, 1,670 |
| .303 Savage. 150 grains | 1,190 |
| .308 Winchester. 125, 150 grains | 1,300, 1,400 |

In addition, for those hunters who do not mind a rifle that delivers a hefty recoil and who want maximum power with the flattest trajectory at the longest ranges, the following magnums are also highly recommended. These should not be used if the hunter is bothered significantly by the recoil.

*Foot-Pounds
at 300 Yards*

| | |
|-------------------------------------------------|-------|
| .264 Winchester Magnum. 140 grains | 1,910 |
| .270 Weatherby Magnum. 150 grains | 1,967 |
| 7mm Remington Magnum. 150 grains | 1,990 |
| 7mm Weatherby Magnum. 154 grains | 1,994 |
| .300 H&H Magnum. 180 grains | 1,970 |
| .300 Winchester Magnum. 150 grains | 1,970 |

Caribou

The caribou is a large animal, with bulls weighing over 600 pounds, and is usually shot at long ranges. Therefore, suggested calibers range from the .264 Winchester Magnum up to the .340 Weatherby Magnum, using medium- and large-size bullets. Since grizzly bears are often encountered in caribou country, calibers that are also suitable for grizzlies are marked with an asterisk (*). Only bullets as large as 180, 200 grains should be used on these dangerous bears.

- .264 Winchester Magnum. 140 grains.
- .270 Winchester. 130 grains.
- .270 Weatherby Magnum. 150 grains.
- .280 Remington. 150 grains.
- .284 Winchester. 150 grains.
- 7mm Remington Magnum. 150, 175 grains.
- 7mm Weatherby Magnum. 154 grains.
- .30/06 Springfield. 150, 180 grains.
- *.300 H&H Magnum. 150, 180 grains,
- *.300 Winchester Magnum. 150, 180 grains.
- *.300 Weatherby Magnum. 150, 180 grains.
- .308 Winchester. 150, 180 grains.
- *.308 Norma Magnum. 180 grains.
- *.338 Winchester Magnum. 200 grains.
- *.340 Weatherby Magnum. 200 grains.

Moose and Elk

Moose and elk are big animals, some weighing over 1,000 pounds. In addition, they have heavy

bone and muscle structures, which require powerful cartridges, capable of deep penetration to reach vital organs. Bullets that are too light or that expand too rapidly break up prematurely, leaving wounded animals. Of the two animals, moose are easier to bring down, especially since shots are usually at closer range than on elk. Many an Alaskan moose has been killed with a .30/30, but this does not mean it is a heavy enough load, especially for big bulls, which require as powerful a cartridge as elk. Elk are often killed at over 300 yards, many with rear quartering shots. In addition, elk are ranked as the third most difficult North American animal to kill. Thus, the best loads are 180 grains or more, of heavily constructed bullets, with the .30/06 considered minimum for both moose and elk. The more powerful magnums are even better. The following are recommended:

*Foot-Pounds
of Energy
at 300 Yards*

| | |
|------------------------------------------------------|------------------------------------------------------------------------------|
| *.30/06. 180, 220 grains | 1,210, 1,360 (Norma loads are more powerful: 1,778 and 1,599) |
| .300 Winchester Magnum. 180, 220 grains | 2,380, 2,070 |
| .300 H&H Magnum. 180, 220 grains | 1,970, 1,840 |

*Foot-Pounds
of Energy
at 300 Yards*

| | | |
|----------------------------------|------------|--------------|
| .300 Weatherby Magnum. | 180, | |
| 220 grains | ..... | 2,448, 2,257 |
| *.303 British. | 180 grains |1,440 |
| *.308 Winchester. | 180 grains |1,540 |
| .308 Norma Magnum. | 180 | |
| grains | ..... | 2,427 |
| .338 Winchester Magnum. | 200, | |
| 300 grains | ..... | 2,090, 1,900 |
| .340 Weatherby Magnum. | 200, | |
| 250 grains | ..... | 2,442, 2,425 |
| .350 Remington Magnum. | 200, | |
| 250 grains | ..... | 1,550, 1,780 |
| .358 Norma Magnum. | 250 | |
| grains | ..... | 2,223 |
| .375 H&H Magnum. | 270 grains |2,370 |
| ** .378 Weatherby Magnum. | 270 | |
| grains | ..... | 3,210 |

Grizzly, Polar Bear, Alaskan Brown Bear

The best rifle for these dangerous bears is the most powerful the hunter can aim and shoot well. Not only must the hunter be able to kill the bear, he must stop it as well. These bears are seldom stopped with the first shot, even a shot in the heart-lung area. Once hit, a bear not downed will either: (1) run away or (2) charge toward the hunter, both with incredible speed. This means that sufficient

* Minimum size for this game.

** Generally, more power than needed.

fire power is necessary to prevent the wounded animal from escaping or from killing the hunter. For this reason, calibers like the .300 Weatherby Magnum should be considered minimum, with bullets 200 grains or heavier. In general, loads for brown bear should be heavier than for either grizzlies or polar bear. The following are recommended:

- .300 Weatherby Magnum. 220 grains.
- .338 Winchester Magnum. 200, 300 grains.
- .340 Weatherby Magnum. 250 grains.
- .358 Norma Magnum. 250 grains.
- .375 H&H Magnum. 270, 300 grains.
- .378 Weatherby Magnum. 270, 300 grains.

Elephant, Rhino, Buffalo

By law, .40 calibers or over must be used to hunt these species in Africa. Solid bullets are used to penetrate the tough hide and bone of these animals. The following calibers are recommended:

- .458 Winchester Magnum. 500-grain, metal-case bullet.
- .460 Weatherby Magnum. 500-grain, full-metal jacket.

Iron Sights

Types of Rear Sights

There are basically two types of iron rear sights: the *open sight* and the *aperture or peep sight*. Open

sights will be discussed here, and peep sights in a later section.

Types of Open Rear Sights

Open rear sights may be subdivided into types according to design. One common type has a *V-notch*. Some Vs are cut shallow, others fairly deeply. Another type of open rear sight has a *U-notch*. Still a third type, the so-called "*Partridge*" sight, employs a square notch.

A fourth type of sight may utilize a V or U notch, but the sides of the leaf curl upward and inward over the sighting notch. This type is called the *buckhorn sight*.

Selection and Aiming of Open Rear Sights

Of the four types of open rear sights discussed, the Partridge is the most accurate. Thus it is the best for target shooting, but is hard to use for hunting. The figure illustrates proper sighting with a Partridge sight. In order to be accurate, the shooter must center the front square blade directly in the square notch, and just at the bottom of the target. This means focusing on the rear sight, front sight, and target at the same time. This is possible for a young man with good eyesight, who has time to aim, as in target shooting, but it is hard to do speedily in hunting by everyone, especially an older shooter with poor eyesight. If the shooter is far-sighted, he may have trouble focusing on the rear sight; if he is near-sighted, he may have trouble focusing on the front sight and the target.

The buckhorn type sight is still sometimes standard equipment on new rifles. It is popular with inexperienced shooters but is actually the worst type of sight for hunting because the extended wings obscure part of the target and block out part of the light. In addition, most shooters have trouble getting the front bead or blade well down into the notch of the buckhorn sight.

Both the V- and U-notch open sights are better choices for hunting, provided a shallow, wide V or U is used. A shallow V allows the hunter to see more of his game. The light diamond enables the shooter to center the front bead right over the center of the V.

The U-shaped sight is somewhat harder to line up on game than the shallow V, primarily because it is hard for the average hunter to remember to get the front post down into the U at the same place each time a hurried sighting is made. The natural tendency is to look at the target through the U, without getting the post down into the U. The result is to fire high.

Of course, all types of open rear sights have the optical disadvantages already mentioned. It is hard to focus on the front and rear sights and the target at the same time. The rear sight fuzzes up, and the shooter cannot tell how he is holding the front bead in relation to the rear notch. It is easy for the shooter to fail to pull the front bead down into the notch, particularly if the notch is deep and the bottom has less access to light and is darker than the rest.

Types of Mounts and Adjustments of Open Rear Sights

There are variations of the basic types of open rear sights, depending on the system of mounting and adjustment. The oldest type, and the least adjustable, is an extension strap of thin steel upturned at one end to form the sight, and dovetailed into the gun at the other end. Elevation adjustment is accomplished by spring-lifting the rear of the sight into a series of elevated notches. Each notch, depending upon the length of the rifle barrel and the gradations of the notches, represents several inches' change. Windage adjustment is obtained by moving the entire sight sideways with a punch and hammer.

There have been some refinements made to this basic spring-steel design, allowing for easier adjustment. Williams offers a dovetail open sight with a locking and unlocking screw, which allows the whole sight to be moved for windage adjustment. Elevation variation is obtained by selecting leafs of various heights, plus an elevation set screw that can be turned a full $\frac{1}{16}$ ".

Another system is to provide an adjustable notch. Lyman offers a leaf sight, available in various heights, which is also adjustable by unlocking two screws that hold the elevation blade firmly in place. Thus, the folding leaf sight is available as an auxiliary sight on scope-mounted rifles.

Another type of mount and adjustment for an open rear sight is offered by Williams—the guide open sight. It can be obtained in various types and

heights of blades, and it offers positive locking adjustments for both windage and elevation.

Adjusting the Open Rear Sight

In making adjustments to a rear sight, the shooter must remember that *the adjustment must be made in the direction of the needed correction*. If a gun is shooting high, the elevation of the rear sight must be adjusted downward; if a gun is shooting to the left, the windage adjustment must be made to the right.

Suppose a gun is shooting high, and the open notch cannot be adjusted downward as needed. In such a case, either a lower blade should be installed or the notch should be filed down to the desired depth to lower the line of sight. If a gun is shooting too low, and putting the sight on the next step upward makes it shoot too high, leave the adjustment on the higher step and file down the notch as necessary, or install a lower blade.

Adjusting windage is sometimes difficult. Dove-tail-mounted rear sights without screw adjustments have to be tapped with a punch and hammer in the direction the correction is needed.

The Rear Aperture or Peep Sight

The aperture or peep sight is essentially a hole through which the shooter looks, lining up the front bead in the center of the hole. This type of sight is the most accurate of all the iron sights, whether for target shooting or hunting. One advantage is that the eye does not focus on the rear aperture

but looks through it to the front sight and target. This eliminates the necessity of focusing on front and rear sights at the same time, and is a real help to the far-sighted shooter. As the eye looks through the aperture, it tends to center the front sight in the aperture automatically, without conscious effort. In practice, the shooter can almost ignore the rear sight, concentrating on getting the front sight lined up with the target.

Peep sights can also be subclassified into three types according to the position of mounting: (1) *tang sight*, which is mounted on the tang, (2) *cocking-piece sight*, which is mounted on the cocking piece, and (3) *receiver sight*, which is mounted on the receiver, and is now the most common. Both the tang and cocking-piece sights are mounted close to the eye, and are thus easy and fast to sight through. For this reason, however, the shooter has to be careful not to be hit in the eye when such sights are mounted on a rifle with a short stock. The tang sight is mounted on a long stem, so is easily bent.

The cocking-piece sight always seems to have some wobble in it and is not particularly accurate.

The receiver sight is by far the most popular today. It is strong, accurate, and easy to adjust, particularly with micrometer click adjustments, and it has practically replaced all other types of rear aperture sights.

Most sights can be adjusted in $\frac{1}{4}$ -minute adjustments, others in $\frac{1}{2}$ -minute adjustments. More precise target sights have $\frac{1}{8}$ -minute adjustments.

Adjusting the elevation 1 minute raises or lowers the elevation 1" at 100 yards, 2" at 200 yards, and so on. So a $\frac{1}{4}$ -minute click would equal $\frac{1}{4}$ " at 100 yards or 1" at 400 yards.

Sight Discs and Aperture Sizes for Rear Sights

All aperture receiver sights can be obtained with different size sight discs and different types and sizes of apertures. One sight manufacturer recommends an aperture diameter of .040" (the smallest) for target shooting, and .093" (the largest) for hunting. Another company makes an aperture (the inner hole) with a diameter of .125".

Some receiver sights come with insert discs for target shooting. These decrease the size of the aperture. They may be fine for the most accurate shooting on a range but should never be used for hunting, since they decrease the field of vision. The best aperture for hunting is one with the largest hole, since it lets in more light and enables the shooter to see through the aperture easily to locate the game.

Advantages of a Peep Sight

A peep sight with an adequate size hole is the fastest of all sights and far more accurate than an open sight. The hunter can focus on a running deer faster than with an open sight or a low-powered scope. The peep sight is the best choice for brush hunting at short ranges. For distance shooting, the scope is preferred, of course, because of its powers

of magnification. However, a rifle that is equipped with both scope and iron sights is quite useful, particularly when the scope fogs up in the rain or snow. The Lyman 48 Receiver Sight has a slide that can be taken in or out instantly, without changing the setting of the sight, so is quite useful when used as an auxiliary sight along with a scope with a quick-detachable side mount.

Types of Front Sights

Front sights can be divided into two basic types: (1) the *open front sight* and (2) the *hooded front sight*. Generally, the open sight is used for hunting and the hooded sight for target shooting. The hooded front sight is often referred to as a *target front sight*. Each of these basic types has subcategories of design, which are discussed in detail in succeeding sections.

Open Front Sights

The simplest type of open front sight is a blade, usually with a colored bead at the top front, dovetailed or pinned to the front of the barrel. There are two basic designs of Lyman open front sights. Numbers 3 and 28 are dovetailed to the barrel directly. The two are identical except for bead size. Either may be obtained in heights of .290", .330", .345", .360", .390", .410", .445", .500", or .560". Numbers 26 and 32 open sights are identical also except for bead size and are pinned between sight lugs at the muzzle. Each of the four sights

mentioned here is offered with a choice of ivory, silver, gold, or red bead. Under most hunting conditions, the $\frac{3}{32}$ " bead is preferred.

More commonly, especially on rifles that have high receiver sights, open front sights are mounted on a ramp. The well-known Williams front sights are mounted on low-base and high-base ramps. The methods of attaching the ramp to the barrel and the sight to the ramp are simple. These sighting blades come in two different widths and a variety of heights.

There are a variety of methods of attaching ramps to the barrel: they may be screwed on, sweated on, or slid on with a band.

The question arises as to the best color of bead for hunting and target work. Under poor light conditions, such as in thick woods, the ivory bead is the most visible. In bright sunlight, the red plastic bead is best, but for all-around hunting conditions, the gold bead is preferred, especially one that is flat on the forward face. A flat face is best because it does not reflect the sunlight as easily as a round bead. When the bead is round, the side on which the sun is shining looks the brightest. Under these conditions, there is a tendency for the hunter to see only the bright side of the bead and pull his aim off to the right or left, depending on which way the sun is shining. If the light is coming from the hunter's right, he sees the right side of the bead, moves the muzzle left, and shoots to the left. The flat-faced bead tends to minimize this tendency to shoot away from the light.

For target shooting, a plain, flat-topped, iron blade sight, smoked black enough with camphor or a match, is the most accurate of open front sights. Such a blade is hard to use on game, however.

Hooded Front Sights

Hooded front sights are just what the name implies: front sights with a round, tubular hood over them. Such a sight is really a front aperture sight. The shooter takes aim by centering the bull in the front aperture. When this is used along with a receiver aperture sight, the combination is considered by every expert to be the most accurate iron sight for target shooting. The front aperture is centered over the bullseye, and these together placed in the center of the rear aperture. Such a sight alignment is the most precise that can be accomplished with iron sights.

Most hooded front sights come equipped with steel or plastic inserts to change the size and shape of the aperture, to take advantage of various lighting, distance, and target conditions.

Correcting Front Sight Error

Since a front sight is not adjustable, a method must be found to correct for front sight error if a much higher sight, such as a micrometer receiver sight, is mounted on the rear. Sometimes errors can be adjusted in the rear sight alone. However, if the rear sight is too high but has already been adjusted as low as possible, some method must be

Amount of Adjustment Necessary to Correct Front Sight Error

| Ins. | Distance Between Front and Rear Sights | | | | | | | | | |
|------|----------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 14" | 15" | 16" | 17" | 18" | 19" | 20" | 21" | 22" | 23" |
| 1 | .0038 | .0041 | .0044 | .0047 | .0050 | .0053 | .0055 | .0058 | .0061 | .0064 |
| 2 | .0078 | .0083 | .0089 | .0094 | .0100 | .0105 | .0111 | .0116 | .0122 | .0127 |
| 3 | .0117 | .0125 | .0133 | .0142 | .0150 | .0159 | .0167 | .0175 | .0184 | .0192 |
| 4 | .0155 | .0167 | .0178 | .0189 | .0200 | .0211 | .0222 | .0234 | .0244 | .0255 |
| 5 | .0194 | .0208 | .0222 | .0236 | .0250 | .0264 | .0278 | .0292 | .0306 | .0319 |
| 6 | .0233 | .0250 | .0267 | .0283 | .0300 | .0317 | .0333 | .0350 | .0367 | .0384 |

The table above shows the increase in front sight height that's required to compensate for a given error at 100 yards. Suppose your rifle has a 27" sight radius, and shoots 4" high at 100 yards, with the receiver sight adjusted as low as possible. The 27" column shows that the correction for a 4" error is .0300".

found for raising the front sight. This is the principal reason different height blades and ramps are sold. But how does the shooter know how high to raise the front sight? The table gives the amount of adjustment necessary to correct front sight error.

Telescope Sights

Types of Scopes: Magnification and Selection

There are two general types of scopes: *fixed-power scopes* and *variable-power scopes*. Fixed-power scopes are found in different magnifications from 1X up through 36X, with 2X through 6X the most popular for big-game hunting.

Distance Between Front and Rear Sights

| 24" | 25" | 26" | 27" | 28" | 29" | 30" | 31" | 32" | 33" | 34" |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .0066 | .0069 | .0072 | .0074 | .0077 | .0080 | .0082 | .0085 | .0088 | .0091 | .0093 |
| .0133 | .0138 | .0144 | .0149 | .0155 | .0160 | .0156 | .0171 | .0177 | .0182 | .0188 |
| .0201 | .0209 | .0217 | .0226 | .0234 | .0243 | .0251 | .0259 | .0268 | .0276 | .0285 |
| .0266 | .0278 | .0289 | .0300 | .0311 | .0322 | .0333 | .0344 | .0355 | .0366 | .0377 |
| .0333 | .0347 | .0361 | .0375 | .0389 | .0403 | .0417 | .0431 | .0445 | .0458 | .0472 |
| .0400 | .0417 | .0434 | .0450 | .0467 | .0484 | .0500 | .0517 | .0534 | .0551 | .0567 |

This correction is added to the overall height of the front sight (including dovetail). Use a micrometer or similar accurate device to measure sight height. Thus, if your original sight measured .360", it should be replaced with a sight .390" high, such as a J height sight.

Variable-power scope ranges are:

| | |
|---------|--------|
| 1X-4X | 2½X-8X |
| 1½X-4X | 2½X-9X |
| 1½X-4½X | 3X-6X |
| 1½X-5X | 3X-7X |
| 1½X-6X | 3X-8X |
| 1¾X-5X | 3X-9X |
| 2X-5X | 3X-10X |
| 2X-7X | 4X-12X |
| 2½X-5X | 5X-13X |
| 2½X-7X | 6X-18X |

The 3X-9X is the most popular choice for all-around hunting purposes.

Scopes are also classified according to use. The four most usual divisions are: (1) big-game scopes,

(2) varmint scopes, (3) target scopes, and (4) scopes for .22's. Big-game scopes are usually of low magnification, the exact amount depending on the type of hunting. For brush and woods shooting, a 2½X–3X scope is best, since it lets in a lot of light and gives a wide field of view. A 2½X scope gives a field of view of approximately 40' at 100 yards. For the hunter who does a lot of hunting in mountain terrain and in flat, open country at long ranges, a 4X scope is a popular choice, but is difficult to use in the woods. About 6X is the maximum upper limit of magnification for a hunter who wants to combine long-range deer, antelope, sheep, or goat hunting with occasional varmint plinking. Such a choice is also a good one for the long-range trophy hunter who needs this much power to pick out good racks or horns from herds of animals, and who is able to get standing shots. However, the field of view is only 20' at 100 yards, so this is a difficult scope to use on running whitetails and is not recommended for most hunting purposes.

The varmint scopes are designed to take birds, small animals, and predators at long distances, so the magnification may run from 6X to 15X. For serious, very long-range shooting with rifles with super-flat trajectories, 8X to 15X scopes are used.

Target scopes usually have the highest magnification. Small-bore shooters usually select scopes as high as 20X or even 30X. Those using .30 caliber rifles are often annoyed by mirage when scope powers are too high, so 10X–12X is usually the upper limit.

Scopes for .22's are relatively inexpensive (\$10-\$20 will provide a good scope), since the optical requirements are not as great as on big-game rifles and the .22 scopes do not have to be constructed to take the heavy recoil of centerfire cartridges. Usually, powers of 4X-6X are most popular.

It should be obvious that the hunter who shoots a variety of game under different conditions is best off with a variable power scope that is adjustable from about 2½X-9X. The 2½X is small enough for big-game woods hunting and the 9X powerful enough for varmint plinking. If the hunter wants only big-game hunting, a scope 2X-7X is certainly adequate.

The variable-power scope is the most versatile choice, but it does have some disadvantages. It is long and heavy. The Leupold Vari-X AO Scope, adjustable from 3X to 9X, weighs 14.6 ounces and is 12.7" long. This is in contrast to Leupold's M8-3X scope, which weighs 8¼ ounces and is only 10.13" long.

Also, variable-power scopes are not as sturdy as the fixed-power models, even though they are now made stronger than they once were. They must utilize a larger objective lens to let in light. Even then, the field of view is smaller at each setting than on the fixed-power models. In spite of these objections, however, the variable-power scopes are still a wise choice for the average hunter.

Magnification, Eyepiece, and Field of View

The reason scopes with too high a magnification

cannot be used is that the larger the magnification the smaller the field of view. Field of view is measured in feet, as the horizontal area viewed at 100 yards distance when looking through a scope. The table shows the field of view at 100 yards of various Lyman scopes of different power.

Field of View of Lyman Scopes

| Magnification | 2½ | 3 | 4 | 6 | 8 | 10 | 12 | 15 | 20 | 25 | 30 |
|----------------------------|----|----|----|----|----|----|-----|-----|-----|-----|----|
| Field of View (in feet) | 43 | 35 | 30 | 20 | 14 | 12 | 9.3 | 8.9 | 5.6 | 4.3 | 4 |

It is obvious that very high-powered scopes can be used only on stationary targets, or for standing game such as in varmint shooting. However, when game is running, especially at close ranges, a low-powered scope with a much wider field of view is necessary to pick up the running game. Of course, a high-powered scope, because of its superior magnification, will enable one to look more clearly and deeply into dark woods than a low-powered scope, but if the shooter cannot locate the game because of a narrow field of view, there is no point in using the higher-powered scope.

In an effort to widen the field of view, some manufacturers have widened the eyepiece. Weaver now offers scopes in their regular round eyepieces and in a new W, or wider-view, model. The latter has a flattened but horizontally wider eyepiece to widen the horizontal field of view. The accompany-

ing table, by Weaver, compares the field of view of the regular and wider-view models.

Comparison of Field of View on Regular and Wider-View Models of Weaver Scopes

| Regular Model | K3 | K4 | K6 | V4.5 | V7 | V9 |
|----------------------------|------|------|------|--------|-------|-------|
| Field of View (in feet) | 37 | 30 | 20 | 54-21 | 40-15 | 33-12 |
| Wider View Model | K3-W | K4-W | K6-W | V4.5-W | V7-W | V9-W |
| Field of View (in feet) | 55 | 37½ | 25 | 70-26 | 53-20 | 41-16 |

Redfield also manufactures scopes with this type of eyepiece. Some shooters may have trouble sighting with the flattened eyepiece. If so, they should continue to use the regular round models.

Objective Lens Diameter, Exit Pupil Diameter, and Brightness

One of the considerations in selecting a scope is its *relative brightness*, that is, the amount of illumination allowed in the field of view, which in turn affects the viewer's ability to see the target. The relative brightness of a scope of any kind, including binoculars, is a standard specification used by every manufacturer of optical instruments. A scope with a relative brightness of 25 will be bright and suitable for use in hunting in the dim light of dawn and dusk when game is roaming about. One with a relative brightness of 2.5 will not transmit enough light to see clearly on dark

and cloudy days when aiming at game; it is only bright enough for target shooting in broad daylight on a bright sunny day. It is important, therefore, that the hunter have a scope that he can really see through under poor light conditions.

It is not necessary, however, to have a scope with a relative brightness of much more than 25, because 25 is all the light that the pupil of an eye can utilize. The relative brightness of a scope is determined by squaring the diameter of the *exit pupil*. Thus, relative brightness = (exit pupil diameter)². The exit pupil diameter, in turn, is calculated by dividing the *objective lens diameter* of the scope (in millimeters) by the scope's *magnification* according to the formula that follows.

$$\text{Exit pupil diameter (in mm)} = \frac{\text{Objective lens diameter (in mm)}}{\text{Magnification}}$$

Thus, if a 4X scope has an objective lens diameter of 20mm, the exit pupil diameter is 5mm and the relative brightness is 25. (Since the objective lens diameter is usually stated in inches, conversion to millimeters involves multiplying inches by 25.4, the number of millimeters per inch.)

The maximum relative brightness needed for a scope is 25 because this is all the light the human eye can accommodate. Under dim light conditions, the pupil of the human eye enlarges to a maximum not to exceed 5mm, the identical maximum dimension needed for the exit pupil diameter. A scope can be made with an exit pupil diameter much

larger than 5mm, but the 5mm diameter of the pupil of the eye cannot see more. The only thing a larger exit pupil diameter does is allow the shooter to see through the scope at different angles to the eye lense without having to align the eye precisely to the scope axis. If the pupil is aligned anywhere within the exit pupil, a satisfactory view will be obtained through the scope. This allows the hunter to quickly throw his rifle to his shoulder with cheek pressed against the stock. If the eye comes anywhere within the exit pupil, aim is achieved.

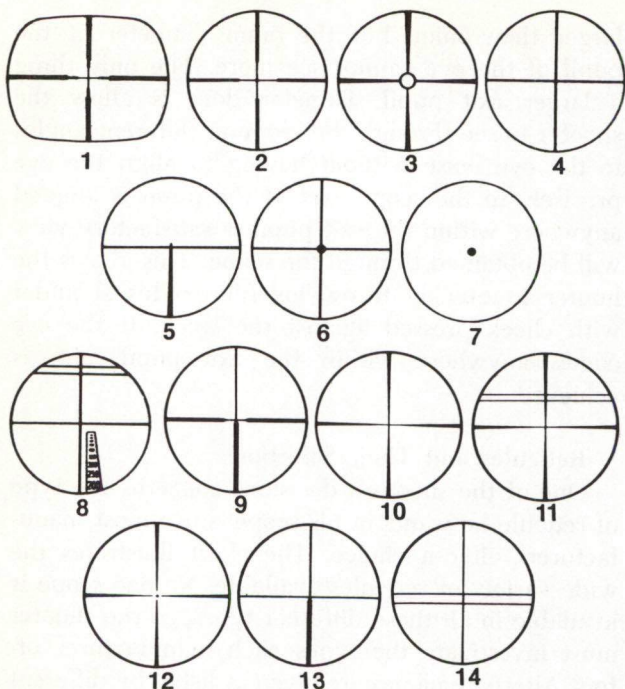
Reticules and Their Selection

One of the shooter's decisions concerns the type of reticule he wants in his scope, since most manufacturers offer a choice. The chart illustrates the wide variety of reticules available. No one scope is available in all these different types, so the shooter must investigate the types each manufacturer offers. Alternate names are given as listed by different manufacturers.

In deciding on a reticule, the shooter needs to consider a number of things.

1. Coarse reticules are easier to see in poor light than fine ones, but they cover up more of a target, particularly at long distances.

2. The shorter the range, the coarser the reticule can be and still not cover up too much target. Long-range targets require fine reticules to keep from being blocked out. One of the most popular reticules at all ranges is the plain crosshair (see No. 4).



Types of reticules available in modern scope sights.

3. The purpose of the horizontal crosshair (see reticule No. 5) is to keep the shooter from canting his rifle as well as to indicate the intersection point.

4. Thick post-type reticules (see Nos. 5, 9, and 13) are picked up easily in poor light and aimed quickly, but block out the target when the hunter has to aim high at long distances. Incidentally,

the correct aiming point for a post is at the top of the post.

5. The intersection of crosshairs gives a clearly defined aiming point. Thick ones are easy to see, but do not define the aiming point well and cover up part of the target; thin ones give a clearly defined aiming point and do not cover up game, but they are harder to see in poor light.

6. Dots come in various sizes (see Nos. 3 and 6). The larger the dot, the more target it covers. A 2-minute dot covers 2" at 100 yards; a 4-minute dot covers 4" at 100 yards, 8" at 200 yards, and 16" at 400 yards. It is easy to see why finer dots are needed at longer ranges.

7. Rangefinder reticules (Nos. 8, 11, 14) are designed to enable the hunter to estimate ranges of animals he is sighting. Obviously, the animal must be standing still before an accurate determination can be made. In reticule No. 11, the hunter turns the range ring on the scope, which moves the top stadia wire until the vital target area is bracketed between the wires. This simultaneously rotates a trajectory cam, tilting the scope to create an automatic elevation correction, so all the hunter has to do is hold the crosshairs on the target.

8. Sometimes a combination reticule is the best answer. Thus, a post and crosshair (see reticule No. 5 or No. 13) provides an easily seen, thick post in poor light as well as a horizontal crosshair to prevent the shooter from canting the rifle. The thick post may obscure part of the target if the

hunter must hold high at long ranges, however. For this reason, Bushnell offers crosshairs with a post that flips up or down. They call this their "Command Post" reticule. The tapered crosshairs (No. 10—the writer's favorite), or the 4-PCCH (No. 1), or the dualine (No. 2—one of the most popular) offer thick crosshairs for easy sighting in poor light but fine intersection lines so that very little of the target is obscured. The crosshairs and dot in No. 12 is also a fine sight for a variety of conditions.

9. A dot alone is one of the fastest of all sights under adequate light conditions (see No. 7). It is not appropriate for target shooting at long ranges, since it obscures too much bullseye, but it is a fine sight for hunting, especially at short ranges, if the dot is not so big that it obscures too much target (No. 3 is too large). If it is fairly small, as it should be, it may be hard to locate in poor light, so under these conditions a crosshair and dot is superior to the dot alone (No. 12).

10. One of the newest types of scopes is Weaver's Quik-Point, which is made for shotguns, centerfire rifles, and .22 rifles. It utilizes a blaze-orange dot, focused to infinity, which is simply put on the target for aiming, with one or both eyes open. It is especially useful for woods or brush shooting. At long ranges it becomes inaccurate, since the dot begins to obscure too much of the target.

11. To aid under poor light conditions, some scopes come equipped with a lighted aiming point. Bushnell's Scopechief V has a lighted aiming point

powered by a compact battery, which is clicked on at dawn or dusk. When off under normal light conditions, only the crosshairs remain in view.

Eye Relief and Its Adjustment

Eye relief is the distance the eye must be held back of the rear end of the scope to see a full field through it. With target scopes, the range is about $1\frac{7}{8}$ " to $2\frac{1}{2}$ ". With hunting scopes, the range is from about 3" to 5", with 3+ being the most common. For scopes for .22's, the range varies from 2" to 4", with the usual distance somewhat shorter than on high-powered rifles, since the shooter does not have to worry about recoil. The manufacturer of each scope specifies the correct eye relief or eye relief range for it, in inches. Of course, most scopes offer a satisfactory field of view over a range of distances, so the shooter does not have to place his eye at the exact distance away from the scope. But if his eye is closer or farther than the range, he will get only a partial field of view or will black out his field of view entirely. Therefore, it is necessary to mount the scope so that correct eye relief is obtained with the shooter's cheek correctly and comfortably placed on the cheekpiece. Also, if the shooter gets his eye too close to the scope of a high-powered rifle, the kickback caused by the recoil may severely injure his eye.

In order to mount the hunting scope on the rifle to give the correct eye relief, the scope and mount must be selected in relation to each other so the scope can be positioned properly. The scope mount-

ing is secured to the scope tube by two rings. The rings can be located to encircle the scope tube anywhere between the enlarged eyepiece and the enlarged objective, except where the housing of the adjusting dials comes. Therefore, the mount must be screwed on the rifle in such a fore-and-aft position that there is no trouble in locating the eyepiece of the scope at the correct distance from the eye, and the rings must encircle the scope tube at places where it is possible for them to do so. A mount that can be secured only in a fixed place may not allow the scope tube to be positioned correctly and at a place where the rings can encircle the tube. With most combinations of scopes, mounts, and rifles there is no trouble, but with others, correct eye-relief adjustment is impossible. Before buying, if the shooter is not sure, he should hold the scope on the rifle temporarily in correct eye-relief position, and similarly hold the mount where it has to be, and see if the rings will encircle the scope tube at a possible location.

Scope Mounts with Adjustments

The first consideration in selecting a scope mount is whether or not the scope the shooter is using has internal adjustments for windage and elevation or whether the adjustments must be made in the mount. Most scopes today have internal adjustments, although some mounts have windage adjustments even when this adjustment is also in the scope. This makes it easier to get the scope lined up.

If the shooter wants to use one scope on several rifles, he can use adjustable scope mounts on each rifle. Thus, he can move the scope from one rifle to the other and always be in adjustment. Or, if the shooter wants to use two scopes on one rifle, for example, a 2X and a 6X scope, he can sight in one scope by adjusting for windage and elevation in the base and in the other by adjustments within the tube. Two widely used mounts with external adjustments are the Custom Mounts by Bausch and Lomb (with one-piece or two-piece base) and Leupold's M3 Adjusto. Buehler also makes a Micro Dial Universal Mount, which is advertised as appropriate primarily for scopes with internal adjustments. By using it, the shooter can keep the reticule of the scope perfectly centered (assuming the reticule is the type that moves as the scope is adjusted), and do only the fine adjustments internally.

Of course, the scope mounts of some target scopes have the adjustments in the mounts. Included in this group are Unertl's Target Mounts or Dehorned Mounts (for varmint scopes) and Lyman's 3-Point Mount for target scopes.

Types of Mounts for Scopes with Internal Adjustments

Mounts for scopes with internal adjustments in the tube can be grouped into seven categories: (1) *two-base top mount*, (2) *bridge mount*, (3) *see-through bridge mount*, (4) *side-bracket mount*, (5) *swing or pivot mount*, (6) *offset mount*, and (7) *tip-off mount*.

The *two-base top mount* has two separate bases with detachable or integral rings for encircling and holding the scope. The bases are screwed into the receiver, and the rings that hold the scope are in turn screwed into the bases, with the scope forming a connecting bridge. This type of mount is designed primarily for the shooter who wants to put his scope on his rifle and leave it there. If the scope does not work, or fogs up, the shooter can remove it from the rings (some even have detachable mounts), but the bases still prevent the use of iron sights. However, the shooter can install another scope, already sighted in, if this happens.

The *bridge mount* is also a top mount, but has a metal piece connecting the bases and an integral part of them. This type of mount is strong and solid and quite appropriate for heavy calibers with a lot of recoil. The metal base has rings for holding the scope, as do other mounts. Bases are usually screwed to the rifle. Some have a dovetail or other arrangement so the rings and scope can be removed together from the scope base. Some of these mounts can be used with auxiliary iron sights, unless the bases get in the way.

The *see-through bridge mount* is designed to allow the shooter to see under the scope if he wants to use iron sights. Since the scope is never removed, it is also readily available for long-range shots, giving the hunter a choice of two different sights at any time. The idea is fine, but such a mount should be used only on rifles with Monte Carlo combs or fairly high roll-over cheekpieces. Otherwise, the

scope is mounted so much higher than the comb that the shooter will have to strain to get his eye high enough to get a good sight through the tube. Since it is mounted high, the scope is ungainly looking and more vulnerable to damage and jarring.

The *side-bracket mount* is designed so the shooter can use either a scope or an iron receiver sight, depending on conditions. But usually the scope must be quickly detachable and the iron receiver sight mounted on a slide, which can be quickly slipped in place. The base portion of the scope mount is screwed and pinned to the side of the receiver, so when the scope and rings are removed there are no obstructions along the top of the barrel that prevent the use of iron sights. This is one of the best choices for the hunter whose scope becomes damaged or fogged and who wants a receiver sight inserted. The excellent Jaeger Quick Detachable Side Mount is a notable example. The rings of this mount can be obtained high enough to use iron sights beneath without removing the scope, if desired.

The Williams QC Side Mount also allows both the scope and the receiver sight to be available for instant use.

The *swing or pivot mount* is basically a hinged bracket screwed to the side or top of the receiver, allowing the shooter to swing the scope out of the way to use the iron sights. Pachmayr makes both a top mount and a side mount. Weaver and Redfield also make excellent models. The writer has used a Weaver Pivot Mount for years and has never found that the scope gets out of adjustment.

The *offset mount* is really a side mount, with the scope offset to one side so that either the scope or iron sight is available for instant use. This type has really only one practical use, and that is for rifles that have top ejectors. The shooter has to cock his head over to the side of the stock to see through the scope, a somewhat awkward way to sight.

The *tip-off mount* is used only on .22 caliber rifles, since it is not as rugged as other mounts. The scope rings are attached directly to dovetail grooves in the receiver rather than first to bases. Such a mount is inexpensive, and it works well for the low-caliber rifle for which it is designed.

Focusing the Scope

All scopes have at least one type of focusing: *eyepiece focusing* (sometimes called *ocular focusing* or *reticule focusing*). This type of focusing means that the eyepiece is adjustable for clearness of reticule. In making this adjustment, loosen the ring or collar that secures the eyepiece and, while looking through the scope, turn the eyepiece sleeve one way then the other until the reticule appears distinct and black. Then screw the locking collar up tight.

While the adjustment is to focus the reticule, it will also affect the clarity of the target at both extremes of adjustment. While looking through the eyepiece, the shooter will notice that if the eyepiece is turned clockwise far enough, not only will the reticule get out of focus, but the image of the target as well. As the eyepiece is turned clockwise, the image of the target becomes smaller. Similarly, if

the eyepiece is turned counterclockwise, the reticule gets out of focus, and eventually the image of the target, except in this instance the target gets larger. In focusing on the reticule, it is also helpful to look at the target occasionally to see if the clearest image is also obtained.

More powerful scopes, generally 8X or 9X power and above, and some makes of variable scopes also have a *range or distance adjustment*, which is accomplished by moving the objective lens back or forward. Scopes that have this adjustment have two knurled sleeves at the front end. The rear sleeve has a micrometer graduation for distances, with the yardage marked on it. To focus, the front sleeve is unscrewed several turns, and the rear sleeve is set on the proper distance. Then the front sleeve is screwed up tight. Since the focus is not changed until the front sleeve is tight, it is vital to be certain this is done.

Unless scopes of 8X or 9X and above are focused for distance to give a clear image, parallax will result. Parallax appears as a movement of the reticule on the target when the eye is moved up and down. To check to see if it is present, move the eye up, down, and sideways while aiming at a target. If the reticule moves on the target, the scope contains parallax and will be inaccurate, since the aim will move as the reticule moves. Also, the center of the reticule will not be the actual point of impact of the bullet. Focusing for distance removes the parallax. On lower-power scopes that do not have a range adjustment on the objective lens, the scope is usu-

ally factory adjusted to be parallax-free at 100 yards. This insures minimal parallax at all ranges.

Fogging of the Scope

Fogging is caused by the condensation of moisture on the inside of the lenses of the scope. Quality scopes are filled with the dry gas nitrogen and properly sealed against leakage, so ought never to fog up. The parts to be sealed are threaded together, and an "O" ring is compressed between them. This is the same kind of seal used in the windows of airplanes and should hold for the life of the scope. To insure this seal, the shooter should never try to take his scope apart. If he does, he will let out the nitrogen, let in moisture, and fogging will result. If a scope begins to fog up, the best thing to do is send it back to the manufacturer.

There are some things the shooter can do to minimize the possibility of fogging. Keep the scope protected from the rain by carrying a thin plastic cover for gun and scope in case of inclement weather, or use scope caps over the lenses. Also, in cold weather, do not take the scope into a heated room, since moisture may condense in it when it is taken back out in the cold. Therefore, leave the scope in the cold overnight if going hunting the next morning. This will prevent fogging on the outside of the lens also.

Adjusting for Windage and Elevation

The method of adjusting the scope for windage and elevation will depend upon whether the scope

has internal adjustments or whether the adjustments are in the scope mount. Sometimes the mount has an adjustment for windage but not for elevation. In this case, the mount adjustment is used to get a rough adjustment for windage, with the fine adjustment accomplished internally.

Let us assume first that the scope can be internally adjusted. This means it has two adjusting dials, one on the top of the scope, for elevation, and one on the side of the scope, for windage. Some dials have clicks and/or gradations of $\frac{1}{4}$ minute, others of $\frac{1}{2}$ minute, and still others for 1 minute. The table below shows the theoretical change in impact for different minutes of angle at various distances.

Theoretical change in point of impact at different distances with various graduations of scope dial adjustments

| Graduations of Adjustment | Changes in Impact at Each Distance (in inches) | | | | | | | | |
|---------------------------|------------------------------------------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|-----------------|-----|
| | 25 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 |
| | (Yards) | | | | | | | | |
| $\frac{1}{4}$ Minute | $\frac{1}{16}"$ | $\frac{1}{8}"$ | $\frac{3}{16}"$ | $\frac{1}{4}"$ | $\frac{3}{8}"$ | $\frac{1}{2}"$ | $\frac{5}{8}"$ | $\frac{3}{4}"$ | 1" |
| $\frac{1}{2}$ Minute | $\frac{1}{8}"$ | $\frac{1}{4}"$ | $\frac{3}{8}"$ | $\frac{1}{2}"$ | $\frac{3}{4}"$ | 1" | $1\frac{1}{4}"$ | $1\frac{1}{2}"$ | 2" |
| 1 Minute | $\frac{1}{4}"$ | $\frac{1}{2}"$ | $\frac{3}{4}"$ | 1" | $1\frac{1}{2}"$ | 2" | $2\frac{1}{2}"$ | 3" | 4" |

Thus, if a shooter has a scope with adjustment and gradations of $\frac{1}{4}$ minute and wants to change the point of impact of the bullet 1" at 25 yards, he must move the dial 16 clicks or gradations. If he wants to change the point of impact 4" at 200 yards, he must move the dial 8 clicks or gradations. In prac-

tice, the graduations on the scope dials will not be this precise, nor do all cartridges have the same ballistics at different distances, so the only way the shooter can determine the actual change in point of impact of his bullet is by firing groups of shots. (See the following section on sighting in a rifle.)

If the scope does not have internal adjustments, the adjustments must be made in the mount. Usually, mount adjustments for hunting scopes are not as precise or accurate as are internal adjustments, but most target mounts click in $\frac{1}{4}$ " adjustments and are very accurate. On Bausch and Lomb's two-piece base for custom mounts for hunting scopes, the front base is adjustable for windage, the rear base is adjustable for elevation. On Lyman's three-point suspension mount, for target scopes, the $\frac{1}{4}$ -minute adjustments for windage and elevation are both in the rear mount. Unertl's varmint and target scopes use mounting bases 7.2" apart, which allows for a true $\frac{1}{4}$ -minute click adjustment in the rear mount.

Incidentally, for scopes with externally adjusted mounts, the actual change in point of impact for a certain number of gradations or clicks on the dial will depend partially on how widely the front and rear mounting bases are separated. The farther apart the mounting bases, the more the scope must be moved by the rear base adjustment to achieve a particular change in point of impact. The table shows the relationship between the distance between the mounting bases and the change in impact in inches per 100 yards for scopes with $\frac{1}{4}$ -minute click adjustments.

Relationship of distance between mounting bases and changes in point of impact (in inches) at 100 yards for scopes with $\frac{1}{4}$ -minute click adjustments

| Center to Center of Telescope Bases | Changes in Impact in Inches Per 100 Yds. |
|----------------------------------------|---------------------------------------------|
| 6" | .300 |
| 7.2" | .250 $\frac{1}{4}$ -minute adjustment) |
| 8" | .225 (this allows for a true |
| 9" | .200 |
| 9.6" | .1875 |
| 10" | .180 |
| 10.585" | .170 |
| 10.905" | .165 |
| 11.25" | .160 |
| 11.612" | .155 |
| 12" | .150 |

Only those scope bases with $\frac{1}{4}$ -minute adjustments that have been mounted 7.2" apart provide a true $\frac{1}{4}$ -minute click adjustment. The others are actually adjusted with each click at the number of minutes of angle as there are inches per 100 yards in the table. Thus, scope bases 12" apart allow for a .15-minute adjustment per click at 100 yards.

Scope Specification and Information Chart

| Maker and Model | Magn. | Field at 100 Yds. (feet) | Relative Bright- ness | Eye Relief (in.) |
|----------------------------|-------|--------------------------------|-----------------------------|------------------------|
| American Import Co. | | | | |
| Dickson 25P | 2½ | 35 | 158 | 3 |
| Dickson 40P | 4 | 31½ | 64 | 3 |
| Dickson 44P | 4 | 31½ | 100 | 3 |
| Dickson 64P | 6 | 20½ | 44 | 3 |
| Dickson N15420 | 1½-4 | 71-24 | 169-16 | 3 |
| Dickson N3933 | 3-9 | 31-12 | 122-12 | 3 |
| Dickson N3942 | 3-9 | 31-12 | 177-19 | 3 |
| Bausch & Lomb | | | | |
| Custom Baltur A | 2½ | 43 | 64 | 3¼ |
| Custom Balfor A | 4 | 30 | 56 | 3¼ |
| Custom Balvar 5 | 2½-5 | 40-20 | 164-41 | 3½ |
| Custom Balvar 8A | 2½-8 | 40-12½ | 256-25 | 3½ |
| Trophy Baltur B | 2½ | 42 | 164 | 3 |
| Trophy Balfor B | 4 | 30 | 64 | 3 |
| Trophy Balsix B | 6 | 20 | 36 | 3 |
| Trophy Balvar 8B | 2½-8 | 40-12½ | 207-20 | 3½ |
| Browning | | | | |
| 22 Scope | 4 | 24 | 56 | 2½-4 |
| Wide Angle | 5 | 30 | 58 | 3 |
| | 2½-8 | 44-16 | 121-14 | 2½ |
| Browning | 2-7 | 44-16 | 241-20 | 3-4½ |
| Bushnell | | | | |
| Scopechief IV | 2¾ | 43 | 58 | 4 |
| Scopechief IV | 4 | 32 | 64 | 3¾ |
| Scopechief IV | 6 | 20 | 40 | 4 |
| Scopechief IV | 1½-4½ | 78-26 | 216-23 | 4¼-3¼ |
| Scopechief IV | 2½-8 | 44-15 | 160-16 | 4-3¼ |
| Scopechief IV | 3-9 | 39-13 | 160-18 | 3¾-3¼ |
| Scopechief 22 | 3-8 | 30-12 | 55-6 | 2½ |
| Scopechief V | 4 | 30 | 96 | 3½ |
| Scopechief V | 1½-4 | 76-27½ | 213-27 | 4¼-3¼ |
| Scopechief V | 3-9 | 34-12½ | 169-27 | 3¾-3 |

| Length (in.) | Tube Diam. (in.) | W&E Adjust- ments | Weight (ozs.) | Other Data |
|-----------------|------------------------|-------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| — | 1 | Int. | — | Adj. under protective ring at rear. 4 post reticle in all. Half MOA adj. in straight powers, 1 MOA in variables. |
| — | 1 | Int. | — | |
| — | 1 | Int. | — | |
| — | 1 | Int. | — | |
| — | 1 | Int. | — | |
| — | 1 | Int. | — | |
| — | 1 | Int. | — | |
| 12¼ | 1 | Ext. | 9½ | Custom models must be used with B&L or other adj. mount. Trophy models have internal ½ MOA adj. Custom variables have tapered CH. Straight powers have CH, post, dot. Balfor B has CH; post, tapered CH, dualine, taper dot, dot. Balvar 8B has CH; post, tapered CH, RF, dualine, taper- dot, dot. |
| 12¼ | 1 | Ext. | 9 | |
| 12¾ | 1 | Ext. | 9½ | |
| 12¾ | 1 | Ext. | 10½ | |
| 12½ | 1 | Int. | 11 | |
| 11⅞ | 1 | Int. | 11 | |
| 11⅞ | 1 | Int. | 10¾ | |
| 11⅞ | 1 | Int. | 12½ | |
| 9¾ | .75 | Int. | 6¼ | CH, Post or 4-Plex optional in big game models; dot extra. |
| 11½ | 1 | Int. | 9¾ | |
| 12½ | 1 | Int. | 12 | |
| 11¼ | 1 | Int. | 11½ | |
| 10 | 1 | Int. | 8½ | Scopechief models have Com- mand Post reticle with Magnetic Control Ring. Constantly cen- tered reticles in Scopechiefs, Customs and Banners. Integral mounts extra on Scopechiefs. Phantoms intended for handgun use. |
| 11¾ | 1 | Int. | 10½ | |
| 12½ | 1 | Int. | 11½ | |
| 9¼ | 1 | Int. | 7¾ | |
| 11 | 1 | Int. | 11 | |
| 11½ | 1 | Int. | 12¼ | |
| 11 | ⅞ | Int. | 7½ | Mount rail also in 4x. Battery powered Lite Site reticles in Scopechief V models. |
| 12¼ | 1 | Int. | 10¾ | |
| 10¾ | 1 | Int. | 12 | |
| 12⅞ | 1 | Int. | 14 | |

Scope Specification and Information Chart (Cont.)

| Maker and Model | Magn. | Field at 100 Yds. (feet) | Relative Bright- ness | Eye Relief (In.) |
|-------------------------|------------------------------|--------------------------------|-----------------------------|------------------------|
| Bushnell (cont.) | | | | |
| Custom DM | 2½ | 49 | 64 | 4¼ |
| Custom DM | 4 | 27 | 64 | 3¼ |
| Custom DM | 6 | 19 | 40 | 3¼ |
| Custom DM | 3-9 | 35-12½ | 159-18 | 3¾-3 |
| Custom 22 | 3-7 | 29-13 | 28-5 | 2 |
| Banner | 2½ | 45 | 64 | 4¼ |
| Banner | 4 | 30 | 64 | 4 |
| Banner | 6 | 19½ | 29 | 3¾ |
| Banner | 10 | 12 | 26 | 3½ |
| Banner | 1½-4 | 63-28 | 169-25 | 4¼-3¼ |
| Banner | 3-9 | 39-13 | 115-13 | 3¾-3 |
| Banner | 4-12 | 29-10 | 181-18 | 3¼ |
| Phantom | 1½ | 24 | 441 | 6-17 |
| Phantom | 2½ | 10 | 100 | 7-16 |
| Shotgun | 1 | 92 | 337 | 6 |
| Davis Optical | | | | |
| Spot Shot 1½" | 10, 12, 15, 20, 25, 30 | 10-4 | | 2 |
| Spot Shot 1¼" | 10, 12, 15, 20 | 10-6 | | 2 |
| Habicht | | | | |
| 4 S-D | 4 | 30 | 64 | 3¼ |
| Herter's | | | | |
| Perfect | 1 | 100 | 256 | 3-5 |
| Mark II | 2¾ | 44 | 58 | 3½ |
| Mark IV | 4 | 30 | 64 | 3½ |
| Mark VIII | 8 | 15½ | 22 | 3½ |
| Mark IA | 3-9 | 14-41 | 157-18 | 3½ |
| Mark XXI | 4-12 | 11½-34 | 100-14 | 3½ |

| Length (in.) | Tube Diam. (in.) | W&E Adjust- ments | Weight (ozs.) | Other Data |
|-----------------|------------------------|-------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 10½ | 1 | Int. | 7¾ | Mount rail also in 4x. |
| 11½ | 1 | Int. | 9¾ | |
| 13 | 1 | Int. | 10¾ | |
| 12¼ | 1 | Int. | 12½ | |
| 10 | 7/8 | Int. | 6½ | |
| 10½ | 1 | Int. | 8 | Obj. focuses for range. |
| 11¾ | 1 | Int. | 10 | |
| 13¼ | 1 | Int. | 10½ | |
| 14¼ | 1 | Int. | 14½ | |
| 10 | 1 | Int. | 10¼ | |
| 11¼ | 1 | Int. | 12 | With 40mm obj. |
| 13¼ | 1 | Int. | 15½ | Obj. focuses for range. |
| 7⅝ | 7/8 | Int. | 5 | Magnum Phantoms, extra. |
| 9¼ | 7/8 | Int. | 5½ | |
| 9⅞ | 1 | Int. | 11½ | |
| 25 | .75 | Ext. | | Focus by moving non-rotating obj. lens unit. Ext. mounts in- cluded. Recoil spring extra. |
| 25 | .75 | Ext. | | |
| 11 | 1.18 | Int. | 13 | From Del-Sports. Also with e. only. With light alloy tube (27/mm), mounting rail. Same, e. only. |
| 9¾ | 1 | Int. | 10¼ | A variety of reticles including dots and rangefinders available in different scopes at small price increase. Hudson Bay rimfire 4x. |
| 10¼ | 1 | Int. | 8½ | |
| 11½ | 1 | Int. | 9½ | |
| 12½ | 1 | Int. | 14½ | |
| 12½ | 1 | Int. | 14½ | |
| 13¼ | 1 | Int. | 12½ | |

Scope Specification and Information Chart (Cont.)

| Maker and Model | Magn. | Field at 100 Yds. (feet) | Relative Bright- ness | Eye Relief (in.) |
|-----------------|-------|--------------------------------|-----------------------------|------------------------|
| Hutson | | | | |
| Handgunner | 1 | 9 | — | 25 |
| Hy-Score | | | | |
| Gold Dot 471UV | 2½ | 42 | 96 | 3¾ |
| Gold Dot 475UV | 4 | 27 | 96 | 3½ |
| Gold Dot 473UV | 6 | 19½ | 50 | 3 |
| Gold Dot 477UV | 3·9 | 36·12 | 166·19 | 3 |
| Gold Dot 476UV | 3·9 | 33·12 | 265·29 | 3¼ |
| Red Dot 489UV | 4 | 30 | 96 | 3¾ |
| Red Dot 487UV | 3·9 | 39·13 | 241·27 | 3½ |
| Jana | | | | |
| Jana 4x | 4 | 29 | — | 3½ |
| Economy 4x | 4 | 29 | — | 3½ |
| Deluxe | 4 | 32 | — | 3½ |
| Super | 4 | 32 | — | 3½ |
| JA·2 | 2½ | 32 | — | — |
| JA·6 | 6 | 17½ | — | 3⅝ |
| Zoom | 3·9 | 35·12 | — | — |
| JA·420 | 4 | 15½ | — | — |
| JA·37 | 3·7 | 23·10 | — | 2½·3 |
| Jason | | | | |
| 860 | 4 | 27¼ | 64 | 3½ |
| 864 | 6 | 17½ | 28 | 3¼ |
| 861 | 3·9 | 31½·12 | 112·12 | 3 |
| 865 | 3·9 | 31½·12 | 177·19 | 3 |
| Leupold | | | | |
| M8 | 2 | 25 | 100 | 8.18 |
| M8 | 3 | 43 | 45 | 3.85 |
| M8 | 4 | 30 | 50 | 3.85 |
| M8 | 6 | 18 | | 3.85 |
| M8 | 7½ | 14 | 32 | 3.60 |
| M8 | 10 | 10 | 16 | 3½ |
| M8 | 12 | 9 | 11 | 3½ |
| Vari-X II | 2·7 | 42·18 | 144·17 | 3·7·4.12 |
| Vari-X II | 3·9 | 30.5·13 | 208·23 | 3.5·4.12 |

| Length (in.) | Tube Diam. (in.) | W&E Adjust- ments | Weight (ozs.) | Other Data |
|-----------------|------------------------|-------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5¼ | — | Ext. | 3 | CH ⅞" obj. lens. Adj. in mount. |
| 11 | 1 | Int. | 7¾ | Alloy tubes, rubber eyebrow guards, nitrogen filled. CH, dual CH or post and CH. |
| 12 | 1 | Int. | 9½ | |
| 13¼ | 1 | Int. | 10 | |
| 11½ | 1 | Int. | 11 | |
| 12½ | 1 | Int. | 13¼ | |
| 11½ | 1 | Int. | 10½ | |
| 12¼ | 1 | Int. | 12¼ | |
| 12 | 1 | Int. | 9 | Deluxe model offers choice of dot or Dual-X reticle. Zoom offers choice of crosshair or Dual-X. Others have constantly centered reticles. |
| 12 | 1 | Int. | 9 | |
| 12 | 1 | Int. | 9 | |
| 12 | 1 | Int. | — | |
| 12 | 1 | Int. | 9⅞ | |
| 12 | 1 | Int. | 9 | |
| 12½ | 1 | Int. | 13½ | |
| 11 | ¾ | Int. | 5¼ | |
| 11⅞ | ⅞ | Int. | 9½ | |
| 12 | 1 | Int. | 9 | Constantly centered reticles, ball- bearing click stops, nitrogen filled tubes, coated lenses. |
| 12 | 1 | Int. | 9 | |
| 13¼ | 1 | Int. | 13¾ | |
| 13½ | 1 | Int. | 15¼ | |
| 8.45 | 1 | Int. | 7.25 | Constantly centered reticles; in addition to the crosshair reticle, the post, tapered (CPC), post and duplex, and duplex reticles are optional at no extra cost. Dot reticle extra. 2x suitable for hand- guns and Win. 94. With adj. obj. extra. |
| 10.13 | 1 | Int. | 8.25 | |
| 11.50 | 1 | Int. | 9.00 | |
| 11.7 | 1 | Int. | 10.3 | |
| 12.60 | 1 | Int. | 12.75 | |
| 13 | 1 | Int. | 13¾ | |
| 14½ | 1 | Int. | 14 | |
| 11.00 | 1 | Int. | 10.75 | |
| 12.60 | 1 | Int. | 13.75 | |

Scope Specification and Information Chart (Cont.)

| Maker and Model | Magn. | Field at 100 Yds. (feet) | Relative Bright- ness | Eye Relief (in.) |
|--------------------|------------------------------|---------------------------------|-----------------------------|------------------------|
| Lyman | | | | |
| All-American | 2½ | 43 | | 3¼ |
| All-American | 3 | 35 | | 3¼ |
| All-American | 4 | 30 | | 3¼ |
| All-American | 6 | 20 | | 3¼ |
| ♦ All-American | 8 | 14 | | 3¼ |
| ♦ All-American | 10 | 12 | | 3¼ |
| ♦ L.W.B.R. | 20 | 5.5 | | 2¼ |
| ♦ All-American | 3-9 | 39-13 | — | 3¾-3¼ |
| ♦ Super Targetspot | 10, 12, 15, 20, 25, 30 | 12, 9.3, 8.9, 5.6, 4.3, 4 | 86 | 2-1⅞ |
| Marble | | | | |
| A-2.5 | 2¾ | 43 | 164 | 3½ |
| A-4.0 | 4 | 30 | 64 | 3½ |
| VL-3.9 | 3-9 | 38½-12½ | 177-19 | 3¼ |
| VS-3.9 | 3-9 | 37-10½ | 114-12 | 3¼ |
| Marlin | | | | |
| 300 | 4 | 23 | 25 | 1½ |
| 500 | 3-7 | 24-10 | 49-16 | 1¾ |
| 425 | 4 | 28 | 64 | 3½ |
| 800 | 1½-5 | 55-19 | 256-49 | 3½ |
| Glenfield 400 | 4 | 28 | 64 | 3½ |
| Nickel | | | | |
| Supralyt | 2½ | 42 | 64 | 3½ |
| Supralyt | 4 | 33 | 25 | 3½ |
| Supra | 4 | 32 | 81 | 3½ |
| Supra | 6 | 21 | 36 | 3½ |
| ♦ Supra Varminster | 6 | 24 | 49 | 3¼-5 |
| Supra Vari-Power | 1-4 | 66.5-27.3 | 153-28 | 3½ |
| Supra Vari-Power | 1½-6 | 60-21.6 | 176-36 | 3½ |
| Supra Vari-Power | 2½-7 | 38-21 | 125-36 | 3½ |
| Supra Vari-Power | 2½-9 | 42-15.6 | | 3½ |
| Supra Vari-Power | 3-10 | 30-12 | 100-18.5 | 3½ |

| Length (in.) | Tube Diam. (in.) | W&E Adjust- ments | Weight (ozs.) | Other Data |
|-----------------|------------------------|-------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10½ | 1 | Int. | 8¾ | 2, 3, or 4 minute dot reticle extra. Choice of standard CH, tapered post, or tapered post and CH ret- icles. All-weather reticle caps. All Lyman scopes have new Perma- Center reticle which remains in optical center regardless of changes in W. & E. ⅛ or ¼ MOA clicks. Non-rotating objective lens fo- cusing. ¼ MOA click adjust- ments. Sunshade, extra. Steel case, extra. 5 different dot reti- cles. |
| 11 | 1 | Int. | 9 | |
| 12 | 1 | Int. | 10 | |
| 13⅞ | 1 | Int. | 12¼ | |
| 14⅜ | 1 | Int. | 13 | |
| 15½ | 1 | Int. | 13½ | |
| 17⅞ | 1 | Int. | 15¼ | |
| 10½ | 1 | Int. | 14 | |
| 24·24⅜ | .75 | Ext. | 24¼·25 | |
| 11¾ | 1 | Int. | 10¾ | |
| 11¾ | 1 | Int. | 10¾ | Duralumin tubes, nitrogen filled. Post, CH, dot or 3-post reticle. Variables have ½ MOA adj. |
| 13½ | 1 | Int. | 15½ | |
| 13½ | 1 | Int. | 13½ | |
| 11¾ | ⅞ | Int. | 9 | |
| 12 | ⅞ | Int. | 9½ | Coated lenses, non-magnifying reticles. Tri-Post reticle. A 4x Glenfield M200, suitable for .22 rifles, and with ½ minute adj., is much cheaper. |
| — | 1 | Int. | — | |
| 11⅜ | 1 | Int. | 13½ | |
| 12 | 1 | Int. | 9 | |
| 11½ | 1.024 | Int. | 7½ | ¼ MOA click adjustments. Steel or alloy tubes. Weatherproof ret- icle caps. Crosshair, post and c.h. or post and crosshair reti- cles are standard. New "Diflex" coated lenses. Continental Arms Co. |
| 11½ | 1.024 | Int. | 8 | |
| 11¼ | 1.024 | Int. | 9 | |
| 12½ | 1.024 | Int. | 9 | |
| 12¼ | 1.024 | Int. | 11½ | |
| 10½ | 1.024 | Int. | 13.1 | |
| 12 | 1.181 | Int. | 14.8 | |
| 11¾ | 1.024 | Int. | 11 | |
| 14½ | 1.181 | Int. | 17.3 | |
| 12½ | 1.024 | Int. | 12½ | |

Scope Specification and Information Chart (Cont.)

| Maker and Model | Magn. | Field at 100 Yds. (feet) | Relative Bright- ness | Eye Relief (in.) |
|------------------------|-------|--------------------------------|-----------------------------|------------------------|
| Normark | | | | |
| Singlepoint | 1 | — | — | |
| Precise Imports | | | | |
| NR-15 | 4 | 23 | 14 | 2 |
| 20257 | 3-7 | 23-13 | 43-8 | 3 |
| 20265 | 2½ | 32 | 164 | 3¼ |
| 20244 | 4 | 29 | 64 | 3½ |
| 20249 | 3-9 | 36-13 | 177-19 | 3 |
| 20260 | 10 | 12.2 | 16 | 3 |
| Realist | | | | |
| Apache | 4 | 30 | 6 | 2 |
| Apache | 6 | 20 | 4 | 2 |
| Riflescope | 2½ | 44 | 66 | 3-5 |
| Riflescope | 4 | 31 | 73 | 3-5 |
| Riflescope | 6 | 20 | 38 | 3-5 |
| Brushscope | 1½-4½ | 65-26 | 225-49 | 3-5 |
| Riflescope | 3-9 | 34-12 | 144-16 | 3-5 |
| Auto/Range | 6 | 20 | 38 | 3-5 |
| Auto/Range | 4 | 31 | 73 | 3-5 |
| Auto/Range | 1½-4½ | 65-26 | 225-49 | 3-5 |
| Auto/Range | 3-9 | 34-12 | 144-16 | 3-5 |
| Redfield | | | | |
| Westerner 4x | 4 | 24½ | 27 | 3½ |
| Frontier 4x | 4 | 28½ | 46 | 3½ |
| Widefield 2¾ | 2¾ | 55½ | 49 | 3 |
| Widefield 4 | 4 | 37½ | 46 | 3 |
| Widefield 6 | 6 | 25 | 44 | 3 |
| 12X | 12 | 10 | 13.7 | 3-3¾ |
| Frontier 2-7x | 2-7 | 42-14 | 216-22 | 3½ |
| Widefield | 1¾-5 | 70-27 | 100-16 | 3-3¾ |
| Widefield | 2-7 | 49-19 | 121-25 | 3½ |
| Widefield | 3-9 | 39-15 | 144-20 | 3½ |

| Length (in.) | Tube Diam. (in.) | W&E Adjust- ments | Weight (ozs.) | Other Data |
|-----------------|------------------------|-------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 6¾ | 1 | Int. | 7½ | Usable on rifles, shotguns, hand- guns. |
| 11 | .75 | Int. | 6¾ | Price with mount. All scopes have constantly cen- tered reticle. |
| 11½ | .75 | Int. | 7½ | |
| 12 | 1 | Int. | 9.6 | |
| 12 | 1 | Int. | 9 | |
| 13⅜ | 1 | Int. | 15 | |
| 12½ | 1 | Int. | 10½ | |
| 12½ | .75 | Int. | 7 | Scope piece includes mount. |
| 13¾ | .75 | Int. | 8 | Constantly centered reticles in |
| 10½ | 1 | Int. | 8 | Riflescopes. CH or P&CH stan- dard. Dot extra. Sunshades avail- able. Nitrogen processed. Alumi- num construction. |
| 12⅝ | 1 | Int. | 9 | Supplied with special mounts and range cams for most popular rifles and calibers. |
| 14 | 1 | Int. | 10 | |
| 11 | 1 | Int. | 11½ | |
| 13¼ | 1 | Int. | 11 | |
| 14⅝ | 1 | Int. | 18 | |
| 11 | 1 | Int. | 17 | |
| 12¼ | 1 | Int. | 17 | |
| 12¾ | 1 | Int. | 17 | |
| 9½ | .75 | Int. | 6 | Constantly centered reticles; |
| 11⅝ | 1 | Int. | 9¾ | scratchproof TufCoat finish; W. |
| 10½ | 1 | Int. | 8 | & E. dials adjustable to zero; |
| 11½ | 1 | Int. | 10 | weatherproof sealed. Reticle |
| 13½ | 1 | Int. | 11½ | same size at all powers. Extra |
| 14⅞ | 1 | Int. | 13.5 | for Accu-Range, for dot (not |
| 11¾ | 1 | Int. | 12 | avail. in Sportster). 12X has sep- |
| 10¾ | 1 | Int. | 11½ | arate parallax adj. knob, ¼ |
| | | | | clicks. |
| 11¾ | 1 | Int. | 13 | Mounts solidly. Fine CH, Med. |
| 12½ | 1 | Int. | 14 | CH, ¼" dot. |

Scope Specification and Information Chart (Cont.)

| Maker and Model | Magn. | Field at 100 Yds. (feet) | Relative Bright- ness | Eye Relief (in.) |
|---------------------------|-------------------|--------------------------------|-----------------------------|------------------------|
| Redfield (cont.) | | | | |
| Variable | 4-12 | 27½-9 | 100-22 | 3-3¾ |
| Variable | 6-18 | 16-5½ | 44-5 | 3½ |
| 3200 Target | 12, 16, 20, 24 | 6½, 5¼, 4, 3¾ | 9, 6, 3¼, 2¼ | 2½ |
| Sanders | | | | |
| Bisley 2½x20 | 2½ | 42 | 64 | 3 |
| Bisley 4x33 | 4 | 28 | 64 | 3 |
| Bisley 6x40 | 6 | 19 | 45 | 3 |
| Bisley 8x40 | 8 | 18 | 25 | 3¼ |
| Bisley 10x40 | 10 | 12½ | 16 | 2½ |
| Bisley 5-13x40 | 5-13 | 29-10 | 64-9 | 3 |
| Sears | | | | |
| No. 53801 | 4 | 30 | | 2 |
| No. 53802 | 4 | 28 | | 2 |
| No. 53803 | 3-6 | 20-16 | | |
| No. 53824 | 3 | 37 | | 3-6 |
| No. 53821 | 4 | 30 | | 3¼ |
| No. 43901 | 1 | | | |
| Southern Precision | | | | |
| 562 | 2½ | 40 | 144 | 3½ |
| 564 | 4 | 30 | 64 | 3½ |
| 566 | 6 | 21 | 28 | 3¼ |
| Stoeger | | | | |
| 4x | 4 | 30 | 64 | 3 |
| 6x | 6 | 20 | 28 | 3 |
| 8x | 8 | 16 | 25 | 3 |
| 3x-9x | 3-9 | 38-11 | 170-20 | 3 |

| Length (in.) | Tube Diam. (in.) | W&E Adjust- ments | Weight (ozs.) | Other Data |
|------------------|------------------------|-------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13 $\frac{7}{8}$ | 1 | Int. | 14 | |
| 14 | 1 | Int. | 18 | |
| 23 $\frac{1}{4}$ | 1 | Int. | 21 | |
| 10 $\frac{3}{4}$ | 1 | Int. | 8 $\frac{1}{4}$ | Alum. alloy tubes, $\frac{1}{4}$ " adj., coated lenses. |
| 12 | 1 | Int. | 9 | Two other scopes are also offered: a 3-9x, and a 6x45. Rubber lens covers (clear plastic) avail. |
| 12 $\frac{1}{2}$ | 1 | Int. | 9 $\frac{1}{2}$ | Choice of reticles in CH, PCH, 3-post. |
| 12 $\frac{1}{2}$ | 1 | Int. | 9 $\frac{1}{2}$ | |
| 12 $\frac{1}{2}$ | 1 | Int. | 10 $\frac{1}{4}$ | |
| 14 | 1 | Int. | 14 | |
| 11 $\frac{1}{2}$ | .75 | Int. | 6 | First three scopes for 22's only, complete with rings for grooved receivers. Crosshair or post and crosshair reticle. |
| 11 $\frac{1}{2}$ | .75 | Int. | 8 | |
| | | Int. | 6 $\frac{1}{2}$ | |
| 10 $\frac{3}{8}$ | 1 | Int. | 8 $\frac{1}{2}$ | Big game scopes come with mount rings. Bases available to fit almost all H.P. rifles. Fixed crosshair reticle remains in center regardless of adjustment. No 53824 for Sears M54. |
| 11 $\frac{1}{4}$ | 1 | Int. | 12 | |
| 8 | 1 | Int. | 8 $\frac{1}{2}$ | |
| 12 | 1 | Int. | 9 $\frac{1}{4}$ | Centered reticles, CH or post. All elements sealed. |
| 12 | 1 | Int. | 9 $\frac{1}{4}$ | |
| 12 | 1 | Int. | 9 $\frac{1}{4}$ | |
| 12 | 1 | Int. | 9 | CH only. $\frac{1}{2}$ " clicks. Obj. tube diam. 1 $\frac{1}{2}$ " in fixed powers, 1 $\frac{7}{8}$ " in variable. |
| 12 $\frac{3}{4}$ | 1 | Int. | 9 | |
| 12 | 1 | Int. | 13 | |
| 11 $\frac{1}{2}$ | 1 | Int. | 12 $\frac{3}{4}$ | |

Scope Specification and Information Chart (Cont.)

| Maker and Model | Magn. | Field at 100 Yds. (feet) | Relative Bright- ness | Eye Relief (in.) |
|------------------------|---------------------------------------|--------------------------------|-----------------------------|------------------------|
| Swift | | | | |
| Stag | 4 | 28½ | 64 | 3 |
| Aerolite | 4 | 28½ | 64 | 3 |
| Aerolite | 2½-8 | 32-13 | 164-16 | 3 |
| Yukon | 2½-8 | 32½-13 | 164-16 | 3 |
| Tasco | | | | |
| Zoom Utility | 3-7 | 28-12 | 130-24 | 2¼ |
| Pistol Scope | 1¾ | 23 | 216 | 19 |
| Sniper | 2-5 | 58-19 | 100-16 | 3¼ |
| Super Marksman | 3-9 | 35-14 | 266-29 | 3.2 |
| Omni-View | 3-9 | 43-16 | 114-13 | 3 |
| Thompson/Center | | | | |
| Puma | 1½ | 16 | — | 11-20 |
| Tops | | | | |
| 4X | 4 | 28½ | 64 | 3 |
| 8X | 8 | 14½ | 16 | 3 |
| 3X-9X | 3-9 | 33-15 | 175-19 | 3 |
| United | | | | |
| Golden Hawk | 4 | 30 | 64 | |
| Golden Grizzly | 6 | 18½ | 44 | |
| Golden Falcon | 4-9 | 29½-14 | 100-20 | |
| Golden Plainsman | 3-12 | 33-12½ | 169-11 | |
| Unertl | | | | |
| Falcon | 2¾ | 40 | 75.5 | 4 |
| Hawk | 4 | 34 | 64 | 4 |
| Condor | 6 | 17 | 40 | 3-4 |
| ◆ 1" Target | 6, 8, 10 | 16-10 | 17.6-6.25 | 2 |
| ◆ 1¼" Target | 8, 10, 12, 14 | 12-6 | 15.2-5 | 2 |
| ◆ 1½" Target | 8, 10, 12, 14 16, 18, 20, 24 | 11.5-3.2 | | 2¼ |
| ◆ 2" Target | 8, 10, 12, 14 16, 18, 24 30, 36 | | 22.6-2.5 | 2¼ |

| Length (in.) | Tube Diam. (in.) | W&E Adjust- ments | Weight (ozs.) | Other Data |
|-----------------|------------------------|-------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11.7 | 1 | Int. | 8.5 | Dot, tapered post & CH or Range- finder reticles available on all but Zoom & Game, extra. Range- finder optional on Zoom & Game. All have self-centering reticles. |
| 11¾ | 1 | Int. | 9½ | |
| 13¼ | 1 | Int. | 11¼ | |
| 13¼ | 1 | Int. | 11.3 | |
| 12 | 7/8 | Int. | 9½ | Lens covers furnished. Con- stantly centered reticles. Write the importer, Tasco, for data on complete line. |
| 85/8 | 7/8 | Int. | 7½ | |
| 11¼ | 1 | Int. | 10 | |
| 123/8 | 1 | Int. | 12½ | |
| 12½ | 1 | Int. | 12¼ | |
| 7¾ | .87 | Int. | 5 | Handgun scope, with mount for Contender, S&W or Ruger. |
| 11½ | 1 | Int. | 9½ | Hard-coated lenses, nitrogen filled, shock-proof tested. Write Ed Paul, importer, for data on complete line. |
| 13 | 1 | Int. | 10 | |
| 12¾ | 1 | Int. | 14 | |
| 117/8 | — | Int. | 9½ | Anodized tubes, nitrogen filled. Write United for data on com- plete line. |
| 117/8 | 1 | Int. | 11 | |
| 13½ | 1 | Int. | 12¼ | |
| 13½ | 1 | Int. | 12¾ | |
| 11 | 1 | Int.(1') | 10 | Black dural tube in hunting mod- els. (2 oz. more with steel tube.) |
| 11¾ | 1 | Int.(1') | 10.5 | |
| 13½ | 1 | Int.(1') | 12 | Dural ¼ MOA click mounts. Hard coated lenses. Non-rotating ob- jective lens focusing. |
| 21½ | .75 | Ext. | 21 | |
| 25 | .75 | Ext. | 25 | |
| 25½ | .75 | Ext. | 31 | |
| 26¼ | 1 | Ext. | 44 | |

Scope Specification and Information Chart (Cont.)

| Maker and Model | Magn. | Field at 100 Yds. (feet) | Relative Bright- ness | Eye Relief (in.) |
|-----------------------|-------------------------------------------|--------------------------------|-----------------------------|------------------------|
| Unertl (cont.) | | | | |
| ♦ Varmint, 1¼" | 6, 8, 10, 12 | 14.1-7 | 28.7-1 | 2½ |
| ♦ Ultra Varmint, 2" | 8, 10 12, 15 | 12.6-7 | 39.7-11 | 2½ |
| ♦ Small Game | 4, 6 | 25-17 | 19.4-8.4 | 2¼ |
| ♦ Vulture | 8 10 | 11.2 10.9 | 29 18½ | 3-4 |
| ♦ Programer 200 | 8, 10, 12, 14 16, 18, 20, 24 30, 36 | 11.3-4 | 39-1.9 | |
| ♦ BV-20 | 20 | 8 | 4.4 | 4.4 |
| Universal | | | | |
| Deluxe UC | 2½ | 32 | 172 | 3½ |
| Deluxe UE | 4 | 29 | 64 | 3½ |
| Deluxe UG | 6 | 17½ | 28 | 3¼ |
| Deluxe UL | 3-9 | 34-12 | 177-18 | 3 |
| Weatherby | | | | |
| Mark XXII | 4 | 25 | 50 | 2½-3½ |
| Imperial | 2¾ | 47½ | 90 | 3¼-5 |
| Imperial 4x | 4 | 33 | 81 | 3¼-4½ |
| Imperial 6x | 6 | 21½ | 62 | 3¼-4½ |
| Imperial Variable | 2-7 | 48-17¾ | 324-27 | 4.3-3.1 |
| Imperial Variable | 2¾-10 | 37-14.6 | 296-22 | 4½-3½ |
| Weaver | | | | |
| K1.5 | 1½ | 56 | | 3-5 |
| K2.5 | 2½ | 43 | | 3-6 |
| K3 | 3 | 37 | | 3-6 |

| Length (in.) | Tube Diam. (in.) | W&E Adjust- ments | Weight (ozs.) | Other Data |
|------------------------------------------------------|----------------------------|----------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| 19½ | .875 | Ext. | 26 | ¼ MOA dehorned mounts. With target mounts. |
| 24 | 1 | Ext. | 34 | With dehorned mount. With calibrated head. |
| 18 | .75 | Ext. | 16 | Same as 1" Target but without objective lens focusing. |
| 15⅝ 16⅝ | 1 | E or I | 15½ | Price with internal adj. Price with ¼ MOA click mounts. |
| 26½ | 1 | Ext. | 45 | With new Posa mounts. |
| 17⅞ | 1 | Ext. | 21¼ | Range focus unit near rear of tube. Price is with Posa mounts. Magnum clamp. With standard mounts and clamp ring cheaper. |
| 12 12 12 12¾ | 1 1 1 1 | Int. Int. Int. Int. | 9¼ 9 9 15¼ | Aluminum alloy tubes, centered reticles, coated lenses. Similar Standard series available at lower cost. |
| 11¾ 10½ 11⅞ 12½ 11⅞ ₁₆ 12½ | ⅞ 1 1 1 1 1 | Int. Int. Int. Int. Int. Int. | 9¼ 9¼ 10¼ 12⅝ 12 14⅞ | Focuses in top turret. ¼ MOA adj. for e., 1 MOA for w. in all models. Reticles: CH, post and CH, Lee Dot or Open Dot (extra). |
| 9¾ 10⅝ 10⅝ | 1 1 1 | Int. Int. Int. | 7 8½ 8½ | |

Scope Specification and Information Chart (Cont.)

| Maker and Model | Magn. | Field at 100 Yds. (feet) | Relative Bright- ness | Eye Relief (in.) |
|-----------------------|-------|--------------------------------|-----------------------------|------------------------|
| Weaver (cont.) | | | | |
| K4 | 4 | 31 | | 3-5½ |
| K6 | 6 | 20 | | 3-5 |
| K8 | 8 | 15 | | 3-5 |
| K10 | 10 | 12 | | 3-5 |
| K12 | 12 | 10 | | 3-5 |
| K3-W | 3 | 55 | — | 3¾ |
| K4-W | 4 | 37½ | — | 3¾ |
| K6-W | 6 | 25 | — | 3¾ |
| V4.5-W | 1½-4½ | 70-26 | — | 4 |
| V7-W | 2½-7 | 53-20 | — | 3¾ |
| V9-W | 3-9 | 41-16 | — | 3¾ |
| V4.5 | 1½-4½ | 54-21 | | 3-5 |
| V7 | 2½-7 | 40-15 | | 3-5 |
| V9 | 3-9 | 33-12 | | 3-5 |
| V12 | 4-12 | 24-9 | | 4 |
| V22 | 3-6 | 30-16 | | 2 |
| D4 | 4 | 28 | — | 2 |
| D6 | 6 | 18 | — | 2 |
| Qwik-Point | 1 | — | — | 6 |
| Williams | | | | |
| Guide Line | 4 | 29½ | 64 | 3¾ |
| Guide Line | 1½-4½ | 78-26 | 196-22 | 4½-3¼ |
| Guide Line | 2-6 | 60-20 | 169-18 | 3¼ |
| Guide Line | 3-9 | 39-13 | 161-18 | 3¾-3¼ |
| Twilight | 2½ | 32 | 64 | 3¾ |
| Twilight | 4 | 29 | 64 | 3½ |
| Twilight | 2-6 | 45-17 | 256-28 | 3 |
| Twilight | 3-9 | 36-13 | 161-18 | 3 |
| Wide Guide | 4 | 35 | 64 | 3¼ |

♦ Signifies target and/or varmint scope. Hunting scopes in general are furnished with a choice of reticle—crosshairs, post with crosshairs, tapered or blunt post, or dot crosshairs, etc. The great majority of target and varmint

| Length (in.) | Tube Diam. (in.) | W&E Adjust- ments | Weight (ozs.) | Other Data |
|-----------------|------------------------|-------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11¼ | 1 | Int. | 9½ | Crosswires, post, rangefinder or Dual X reticle optional on all K and V scopes (except no RF in K1½, post in K8, 10, 12, or RF in V22). Dot extra in K and V models only. Objective lens on K8, K10, K12, V9, V12 and V9-W focuses for range. |
| 13⅝ | 1 | Int. | 11 | |
| 15⅜ | 1 | Int. | 12¼ | |
| 15½ | 1 | Int. | 12½ | |
| 15¾ | 1 | Int. | 12½ | |
| 10¾ | 1 | Int. | 12½ | |
| 12 | 1 | Int. | 13¼ | |
| 13¾ | 1 | Int. | 14¼ | |
| 10¾ | 1 | Int. | 14 | |
| 12½ | 1 | Int. | 16 | |
| 13¾ | 1 | Int. | 19¾ | |
| 10 | 1 | Int. | 8½ | |
| 11⅝ | 1 | Int. | 10½ | |
| 13 | 1 | Int. | 13 | |
| 13 | | Int. | 13 | |
| 12½ | .875 | Int. | 4½ | Extra for Dual X reticle. D model prices include N or Tip-Off mount. For rifles and shotguns. Projects red dot aiming point. |
| 11⅝ | .875 | Int. | 4 | |
| 12 | .875 | Int. | 4 | |
| — | — | Int. | 8 | |
| 11¾ | 1 | Int. | 9½ | Coated lenses, nitrogen filled tubes, ½ MOA adj. CH, dot, TNT or Guide reticle. Dot covers 3 MOA at 4x in all models. |
| 9½ | 1 | Int. | 7¾ | |
| 10¼ | 1 | Int. | 10 | |
| 12 | 1 | Int. | 14½ | |
| 11¼ | 1 | Int. | 8½ | More for TNT reticle. |
| 11¾ | 1 | Int. | 9½ | |
| 11½ | 1 | Int. | 11½ | CH, TNT or Guide reticle. |
| 12¾ | 1 | Int. | 13½ | |
| 12¼ | 1 | Int. | 14 | |

scopes have medium or fine crosshairs but post or dot reticles may be ordered. W—Windage E—Elevation MOA—Minute of angle or 1" (approx.) at 100 yards, etc.

Chart of Telescope Mounts

| Maker, Model, Type | Adjust. | Scopes | Suitable For |
|------------------------------------------------|---------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Bausch & Lomb | | | |
| Custom One Piece (T) | Yes | B&L, other 1" scopes. | Most popular rifles. |
| Custom Two Piece | Yes | | |
| Trophy (T) | No | 1". With split rings. | Rings for Weaver bases. |
| Browning | | | |
| One Piece (T) | W only | 1" split rings. | Browning FN rifles. |
| One Piece (T) | No | ¾" split rings. | Browning 22 semi-auto. |
| One Piece Barrel Mount Base | No | Groove mount. | 22 rifles with grooved receiver. |
| Two Piece | No | ¾" ring mount. | For Browning T-bolt 22. |
| B-Square Co. | | | |
| Mono-Mount | No | Leupold M8-2x (mounts ahead of action). | M94 Win. M1 Carbine. |
| Buehler | | | |
| One Piece (T) | W only | ¾" or 1" solid rings; ⅞", 1" or 26mm split rings. 4" or 5" spacing | All popular models. |
| One Piece "Micro-Dial" Universal Two Piece (T) | Yes W only | Same. 4" ring spacing only. Same. Rings for 26.5—27mm adjust to size by shims. | Most popular models. Rem. 700, 721, 722, 725; Win. 70, 52; FN; Rem. 37; Mathieu; Schultz & Larsen; Husc. |
| One Piece Pistol Base | W only | Uses any Buehler rings. | S&W K, Colt, Ruger, Thompson. |
| One Piece (T) | W only | Same. | Rem. 600 rifle and XP100 pistol. |

| | | | |
|-------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Burris | | Most popular rifles. | |
| Supreme One Piece (T) | W only | 1" split rings, 3 heights. | |
| Trophy Two Piece (T) | W only | 1" split rings, 3 heights. | |
| Bushnell | | Most popular rifles. | |
| Detachable (T) | No | 1" only, 2 heights. | |
| Pivot (T) | No | 1" only. | |
| All Purpose | No | Phantom. | |
| Rigid | No | Phantom. | |
| 94 Win. | No | Phantom. | |
| Collins | | Rimfire rifles with grooved receivers. | |
| Bullittco (T) | E only | 1" split rings. | |
| Conetrol | | Sako dovetail bases for S&K bases on M1 Carb., SMLE 4 & 5. | |
| One Piece (T) | W only | 1" solid or split rings. | |
| Two Piece (T) | W only | Same. | |
| Griffin & Howe | | All popular models. | |
| Standard Double Lever (S) | No | All standard models. | |
| E. C. Kerkner Echo (S) | | All popular models. Solid or split rings. | |
| | No | All standard models. | |
| Holden | | Many popular rifles. Rings have oval holes to permit use of iron sights. For 22 rimfire grooved receivers, $\frac{3}{4}$, $\frac{7}{8}$ or 1 inch tubes. For long eye relief scopes on M94 extra. | |
| Ironsighter (T) | No | 1" split rings. | |

Chart of Telescope Mounts (Cont.)

| Maker, Model, Type | Adjust. | Scopes | Suitable For |
|---------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| International Guns Inc. handles the complete line of Parker-Hale (British) Roll-Over and other scope mounts. | | | |
| Jaeger QD, with windage (S) QD Railscope Mount | W only W only | 1", 26mm; 3 heights. | All popular models. For scopes with dovetail rib. |
| Jaguar QD Dovetail (T) | No | 1", 26mm and 26½mm rings. | For BSA Monarch rifle (Galef, importer). |
| Kesseling Standard QD (T) | W only | ¾", ⅞", 1", 26mm—30mm split or solid rings. | All popular rifles, one or two piece bases. |
| See-Em-Under (T) QD Dovetail (T) | W only W only | Same. 1", 26mm. | Rem. 760, 740, 788, Win. 100, 88, Marlin 336. Steyr 22, Sako, BSA, Brno, Krico. |
| Kwik-Site (T) | No | 1" split rings. | Wider-View. Mounts scope high to permit iron sight use. Or offset base for 94 Win. |
| Leupold STD (T) | W only | 1" only, 3 heights. Inter- change with Redfield Jr. and Sr. components. | Most popular rifles. |
| M3 (T) | Yes | 1" only. | Rem. 700, 740, Win. 70, 88, 100, Wby., Mark V, FN, others. Bases reversible to give wide latitude in mounting. |
| Lyman All-American Tru-lock (T) | No | ¾", ⅞", 1", 26mm, split rings. | All popular post-war rifles, plus Savage 99, 98 Mauser. One or two piece bases. |

| | | | |
|------------------------------------------------------------------|----------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Marble Game Getter (T) | No | 1" only. | Many popular rifles. Has see-through base to permit use of iron sights. |
| Marlin One Piece QD (T) | No | 1" split rings. | Most popular models. Glenfield model not as expensive. |
| Numrich Side mount | No | 1" split rings. | M-1 carbine. |
| Pachmayr Lo-Swing (S) | Yes | 3/4", 7/8", 1", 26mm solid or split loops. | All popular rifles. Scope swings aside for instant use of iron sights. |
| Lo-Swing (T) | Yes | 3/4", 7/8", 1", 26mm split rings. | Adjustable base. Win. 70, 88; Rem. 721, 722, 725, 740, 760; Mar. 336; Sav. 99. |
| Precise Imports M-21 (rings only) M-22 (rings only) | No No | 1" tube; not over 32mm obj. 1" tube; 40mm obj. scopes. | Fit Weaver bases. |
| Realist V lock QD (T) | No | 1" split rings. | Most popular rifles. |
| Redfield JR-SR (T) | Won't | 3/4", 1", 26mm. | Low, med. and high, split rings. Reversible extension front rings for 1", 2-piece bases for Mannlicher-Schoenauer and Sako. JR-SR comes with integral folding peep sight. |

Chart of Telescope Mounts (Cont.)

| Maker, Model, Type | Adjust. | Scopes | Suitable For |
|------------------------------|---------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Swing-Over (T) base only | No | 1" (Not for variables.) | Standard height split rings. Also for shot-guns. |
| Ring (T) | No | ¾" and 1" | Split rings for grooved 22's. |
| Frontier (T) bases | No | Takes ¾" or 1" rings. | See-thru bases; shotgun model; Rings. |
| S & K | | | |
| Insta-Mount (T) base only | No | Takes Conetrol, Weaver, Herter or United rings. | M1903, A3, M1 Carbine, Lee Enfield #3, #4, #5, P14, M1917, M98 Mauser, FN Auto, AR-15. For M1 Garand, steel rings. |
| Conventional rings and bases | No | 1" split rings. | Most popular rifles. For "see through underneath" risers add dollars. |
| Sako | | | |
| QD Dovetail (T) | Wonly | 1" or 26mm split rings. | Sako, or any rifle using Sako action. 3 heights and extension rings available. Garcia, importer. |
| Savage | | | |
| Detachable (T) | No | 1" split rings. | Most modern rifles. One or two piece bases. |
| No. 40 (S) | No | 1" | For Savage 340. |
| Tasco | | | |
| 700(T) and 800(S) series | No | 1" split rings, regular or high. | Many popular rifles. Swing mount. |
| M722 | No | Split rings. | For 22s with grooved receivers. |

| | | | |
|--------------------------|-----------------|-------------------------------------------------------|----------------------------------------------------------------------|
| Unertl | | | |
| Posa (T) | Yes | 3/4", 7/8", 1" scopes. | Unertl target or varmint scope. |
| 1/4 Click (T) | Yes | 3/4", 1" target scopes. | Any with regular dovetail scope bases. |
| Dehorned Varmint (T) | Yes | 3/4", 7/8", 1" scopes. | Add for Posa. |
| Weaver | | | |
| Detachable Mount (T & S) | No | 3/4", 7/8", 1", 26mm. | Nearly all modern rifles. Extension rings, 1" extra cost. |
| Type N (S) | No | 3/4" scopes only. | Same. High or low style mounts. |
| Pivot Mount (T) | No | 3/4", 1", 26mm. | Most modern big bore rifles. |
| Tip-Off (T) | No | 7/8". | 22s with grooved receivers. |
| Tip-Off (T) | No | 1", two-piece. | Same. Adapter for Lee Enfield. |
| Williams | | | |
| Offset (S) | No | 3/4", 7/8", 1", 26mm solid, split or extension rings. | Most rifles (with over-bore rings). Br. S.M.L.E. (round rec.) extra. |
| QC (T) | No | Same. | Same. Add extra for micro. windage ring. |
| QC (S) | No | Same. | Most rifles. |
| Sight-Thru | No | 1", 7/8" sleeves. spacing. | Many modern rifles. |
| (S)—Side Mount | | | |
| 26mm = 1.024" | (T)—Top Mount | 22mm = .866" | 25.4mm = 1" |
| | 26.5mm = 1.045" | 30mm = 1.181" | |

Sighting and Aiming

Sighting in a Rifle

Before getting into the details of how to sight in a rifle, some principles should be kept in mind.

The best distance to begin sighting in is 25 yards. The reasons for this range are several. First, it is close enough so that the bullets will generally hit on the target, and one can shoot accurately enough to get a good grouping on one's shots. Second, the scope-sighted big-game rifle that is zeroed in at 25 yards will generally be sighted in at ranges just over 200 yards, depending on the ballistics of the ammunition used.

The reason for this last statement has to do with the trajectory path of a bullet. Bullets do not travel in a straight line, but in a downward curve called a *trajectory*. The bullet begins falling slowly the moment it leaves the muzzle. To compensate for this so the bullet will hit the line of sight, the rear sight is moved upward, and the muzzle must be raised to be on target. Thus, with the muzzle pointed at an angle crossing the line of sight, the bullet crosses the line of sight twice: once near the muzzle as it rises above the line of sight and again at some distance from the muzzle, as it falls below the line of sight.

In other words, if a rifle is sighted in at 25 yards, the trajectory is such that for most high-powered rifles the bullet will again cross the line of sight at ranges just over 200 yards and is therefore sighted in for that range also. Of course, since each caliber has

its own ballistical characteristics, there are some variations. The table shows how high or low a bullet will strike at ranges up to 350 yards when the rifle is set at 0 (for most calibers) or at $-\frac{1}{2}''$, $-\frac{1}{4}''$, $+\frac{1}{4}''$, $+\frac{1}{2}''$ (for a few others calibers) at 25 yards.

From the table, it is clear that there are some calibers (.250 Savage, .300 H&H Magnum, .338 Winchester Magnum, .358 Winchester) that are zeroed in perfectly at 200 yards when sighted in at 25 yards. Most calibers, such as the .30/06 or .308, are zeroed in slightly beyond 200 yards when zeroed at 25 yards. A few calibers, such as the lower-power .22's, because of their low power, fall rapidly and are zeroed in at ranges of 50 to 150 yards when zeroed at 25 yards. Some other calibers, such as the 6mm Remington, are zeroed in at 250 yards when sighted in at 25 yards. Because of their flat trajectory, many of the calibers shown are still accurate out to 300 yards and beyond, even when zeroed at 25 yards. Thus, for all-round purposes, 25 yards is the best range for sighting in. If a hunter wants his rifle zeroed in at much longer ranges, he will have to sight in at 25 yards so that the point of impact at 100 yards is slightly above the inches shown in the chart just discussed. For example, referring to the previous table for a moment, the .30/06 shooting 150-grain bullets is $2\frac{1}{4}''$ high at 100 yards, but 6'' low at 300 yards. How can the shooter zero it in to shoot right on the target at 300 yards? Let us suppose he has a telescopic sight with $\frac{1}{4}$ -minute gradations. Moving the elevation one graduation will raise the sight $\frac{1}{4}''$ at 100 yards and $\frac{3}{4}''$ at 300 yards.

Bullet Impact in Inches at Various Distances When Rifle Is Sighted in at 25 Yards

| Caliber | Bullet Wt. | 25 yds. | 50 yds. | 100 yds. | 150 yds. | 200 yds. | 250 yds. | 300 yds. | 350 yds. |
|----------------------------|------------|---------|---------|----------|----------|----------|----------|----------|----------|
| .22 Long Rifle Hi-Speed 40 | | 0 | + 1/2 | -4 | -16 | ..... | ..... | ..... | ..... |
| .22 Winchester Mag. 40 | | 0 | + 3/4 | 0 | - 1 1/2 | - 6 1/4 | ..... | ..... | ..... |
| .22 Hornet 45 | | 0 | +1 | +1 3/4 | + 1/2 | - 3 1/2 | - 9 | ..... | ..... |
| .220 Swift 45 | | -1/2 | + 1/4 | +1 1/2 | - 1 3/4 | + 1 1/2 | + 1/2 | - 3 | - 7 1/2 |
| .222 Remington 50 | | 0 | + 3/4 | +2 1/4 | + 2 | + 1/2 | - 2 1/2 | - 8 | -14 |
| .222 Remington Mag. 55 | | -1/4 | + 1/2 | +1 1/2 | + 2 | + 1 1/2 | - 1/2 | - 5 | -10 |
| .223 Remington 55 | | -1/4 | + 1/2 | +1 1/2 | + 2 | + 1 1/2 | - 1/2 | - 5 | -10 |
| .22/250 Remington 55 | | -1/4 | + 1/2 | -1 3/4 | + 2 | + 1 1/2 | 0 | - 3 | - 7 1/4 |
| .225 Winchester 55 | | -1/4 | + 1/2 | +2 | + 2 1/4 | + 1 1/2 | - 1 | - 4 | - 8 1/4 |
| .243 Winchester 80 | | -1/4 | + 1/2 | +1 3/4 | + 2 | + 1 1/4 | - 1/2 | - 2 3/4 | - 7 |
| .243 Winchester 100 | | 0 | + 3/4 | +2 | + 2 1/4 | + 1 3/4 | - 1/2 | - 4 | - 9 3/4 |
| 6mm Remington 100 | | 0 | + 3/4 | +1 3/4 | + 2 3/4 | + 2 | 0 | - 4 | - 8 3/4 |
| .244 Remington 75 | | -1/4 | + 1/2 | +1 3/4 | + 2 | + 1 3/4 | - 1/2 | - 2 3/4 | - 7 |
| .244 Remington 90 | | 0 | + 3/4 | +2 | + 2 1/4 | + 1 3/4 | - 1/2 | - 4 1/4 | - 9 |
| .250 Savage 87 | | 0 | + 3/4 | +2 1/4 | + 2 | 0 | - 3 1/2 | - 8 1/2 | -16 |
| .250 Savage 100 | | 0 | +1 | +2 1/4 | + 2 1/4 | + 1 1/2 | - 2 | - 7 | -15 |
| .25/06 Remington 87 | | -1/4 | + 1/2 | +1 3/4 | + 2 | + 1 3/4 | - 1/2 | - 2 3/4 | - 7 |
| .256 Winchester Mag. 60 | | 0 | + 3/4 | +1 1/4 | + 1 1/4 | - 3 | - 8 1/2 | ..... | ..... |
| .257 Roberts 100 | | 0 | +1 | +2 1/4 | + 2 1/4 | + 1 1/2 | - 2 | - 7 | -15 |
| .257 Roberts 117 | | 0 | +1 1/4 | +2 1/4 | + 1 1/2 | - 1 | - 6 1/2 | -14 | ..... |
| 6.5mm Remington Mag.120 | | 0 | + 3/4 | +2 | + 1 3/4 | + 1/2 | - 2 1/4 | - 6 1/2 | -12 1/4 |
| .264 Winchester Mag. 100 | | -1/4 | + 1/4 | +2 | + 2 1/4 | + 2 | + 1/2 | - 2 | - 6 1/4 |
| .264 Winchester Mag. 140 | | 0 | + 3/4 | +2 1/2 | + 2 3/4 | + 2 | 0 | - 3 | - 8 |
| .270 Winchester 100 | | -1/4 | + 3/4 | +1 3/4 | + 2 1/2 | + 1 1/4 | 0 | - 4 | - 8 3/4 |
| .270 Winchester 130 | | 0 | + 3/4 | +2 1/2 | + 2 3/4 | + 2 | 0 | - 4 1/4 | - 9 3/4 |
| .270 Winchester 150 | | 0 | +1 | +1 3/4 | + 1 3/4 | - 1/2 | - 4 | - 8 3/4 | -15 |
| .280 Remington 100 | | -1/4 | + 3/4 | +1 3/4 | + 2 1/4 | + 1 1/2 | 0 | - 3 | - 7 1/2 |
| .280 Remington 125 | | 0 | + 3/4 | +2 1/2 | + 2 1/2 | + 1 1/2 | - 1/4 | - 4 1/2 | - 9 1/4 |
| .280 Remington 150 | | 0 | +1 | +2 1/4 | + 2 1/4 | + 1 1/4 | - 2 | - 6 | -12 |
| .230 Remington 165 | | 0 | +1 | +2 1/2 | + 2 1/4 | + 1 | - 2 1/4 | - 7 1/2 | -15 |
| .284 Winchester 125 | | 0 | +1 | +2 3/4 | + 2 1/2 | + 1 3/4 | - 1/4 | - 4 | - 9 1/2 |
| .284 Winchester 150 | | 0 | +1 | +2 1/2 | + 2 1/2 | + 1 1/4 | - 1 | - 5 1/2 | -11 3/4 |
| 7mm Remington Mag. 125 | | -1/4 | + 3/4 | +2 | + 2 | + 1 1/2 | 0 | - 2 | - 6 |
| 7mm Remington Mag. 150 | | -1/4 | + 3/4 | +1 3/4 | + 2 | + 1 1/4 | - 1/2 | - 3 | - 7 |
| 7mm Remington Mag. 175 | | 0 | +1 | -2 1/4 | + 2 1/4 | + 1 1/4 | - 1 1/2 | - 5 3/4 | -13 1/4 |
| .30/30 Winchester 150 | | 0 | +1 | +2 3/4 | + 2 1/4 | - 3/4 | - 5 | -12 | ..... |
| .30/30 Winchester 170 | | +1/4 | +1 1/4 | +2 3/4 | + 2 | - 2 1/2 | -10 | ..... | ..... |
| .30/06 110 | | 0 | +1 | +2 1/4 | + 2 1/4 | + 1 | - 2 | - 6 1/2 | -14 |
| .30/06 125 | | 0 | + 3/4 | +2 | + 1 3/4 | + 1/2 | - 2 1/4 | - 6 1/2 | -12 3/4 |
| .30/06 150 | | 0 | +1 | +2 1/4 | + 2 1/4 | + 1 1/4 | - 1 1/2 | - 6 | -13 |
| .30/06 180 | | 0 | +1 | +2 1/4 | + 2 1/4 | + 3/4 | - 2 1/2 | - 8 | -16 1/4 |

Point of Impact in Inches at Various Distances When Sight Is Sighted in at 25 Yards (Cont.)

| Caliber | Bullet Wt. | 25 yds. | 50 yds. | 100 yds. | 150 yds. | 200 yds. | 250 yds. | 300 yds. | 350 yds. |
|----------------------|---------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|
| .30/06 | 220 | 0 | +1 | +1¾ | + ½ | - 2 | - 7 | -15 | ..... |
| .300 Winchester Mag. | 150 | 0 | + ¾ | +2¼ | + 2½ | + 1¾ | 0 | - 3 | - 7¾ |
| .300 Winchester Mag. | 180 | 0 | + ¾ | +2 | + 2¼ | + 1¼ | - 1 | - 4½ | -10 |
| .300 H&H Magnum | 150 | 0 | +1 | +2½ | + 3 | + 2 | 0 | - 5 | -10 |
| .300 H&H Magnum | 180 | 0 | +1 | +2 | + 2 | + ½ | - 3 | - 7½ | -14 |
| .300 H&H Magnum | 220 | 0 | + ¾ | +2 | + 1¾ | 0 | - 2¼ | - 8 | -16¾ |
| .300 Savage | 150 | 0 | +1 | +1¾ | + 1¾ | - ½ | - 4 | -10¼ | ..... |
| .300 Savage | 180 | 0 | +1¼ | +2¾ | + 2 | - ½ | - 5½ | -13½ | ..... |
| .308 Winchester | 110 | 0 | +1 | +2¼ | + 2¼ | + 1 | - 2 | - 6½ | -14 |
| .308 Winchester | 125 | 0 | + ¾ | +2 | + 2 | + ½ | - 2¼ | - 6¾ | -13¾ |
| .308 Winchester | 150 | 0 | +1 | +2¼ | + 2 | + ½ | - 2½ | - 7¼ | -13¾ |
| .308 Winchester | 180 | 0 | +1 | +1¾ | + 1¾ | - ½ | - 4 | - 8¾ | -16½ |
| .308 Winchester | 200 | 0 | +1 | +2 | + 1 | - 1 | - 7 | -14½ | ..... |
| .338 Winchester Mag. | 200 | 0 | + ¾ | +2½ | + 2½ | + 1½ | - 2 | - 5¾ | -11¾ |
| .338 Winchester Mag. | 250 | 0 | + ¾ | +2 | + 2 | 0 | - 3¼ | - 9 | -18½ |
| .338 Winchester Mag. | 300 | +¼ | +1¼ | +3 | + 2¾ | 0 | - 5 | -12½ | -22 |
| .35 Remington | 150 | 0 | +1 | +2 | + 1 | - 2¾ | -10 | -19 | ..... |
| .35 Remington | 200 | +¼ | +1½ | +3 | + 1¾ | - 3 | -13 | -23½ | ..... |
| .350 Remington Mag. | 200 | +¼ | +1¼ | +2¾ | + 2¾ | 0 | - 4¾ | -11½ | -19¼ |
| .350 Remington Mag. | 250 | 0 | +1 | +1¾ | + ½ | - 2 | - 7 | -15 | ..... |
| .358 Winchester | 250 | 0 | +1¼ | +2½ | + 2 | 0 | - 4½ | -13¾ | ..... |
| .375 H&H Magnum | 270 | 0 | +1 | +2¼ | + 2¼ | + 1 | - 2 | - 8½ | -18½ |
| .375 H&H Magnum | 300 | +¼ | +1½ | +3 | + 1¾ | 0 | - 4¼ | -12½ | ..... |
| .44 Remington Mag. | 240 | +½ | +2 | +2¾ | 0 | -10½ | ..... | ..... | ..... |
| .444 Marlin | 240 | +¼ | +1½ | +2½ | + 1¾ | - 2 | - 9½ | -20¼ | ..... |
| .458 Winchester Mag. | 510 | +½ | +1¼ | +2½ | + 1¼ | - 2¾ | -14 | -27½ | ..... |

(See a previous table on "Theoretical Change In Point Of Impact At Different Distances With Various Graduations Of Scope Dial Adjustments.") But the sight must be raised 6". $6'' \div \frac{3}{4}'' = 8$ graduations the sight must be raised to put the point of impact on the target at 300 yards. Eight graduations will raise the point of impact $8 \times \frac{1}{4}''$ or 2" at 100 yards (for a total of $2'' + 2\frac{1}{4}''$ or $4\frac{1}{4}''$ high at 100

yards) and $8 \times \frac{1}{16}"$ or $\frac{1}{2}"$ at 25 yards (for a total of $\frac{1}{2}"$ high at 25 yards). The shooter can check this by sighting in at 25 yards (he should be shooting $\frac{1}{2}"$ high) and also at 100 yards (he should be shooting $4\frac{1}{2}"$ high). If he zeroes in at 300 yards, the point of impact will never be over $4\frac{1}{2}"$ high and will only be 6" low at 350 yards.

The shooter should do his sighting in with the same ammunition he intends to use if he is doing target shooting or if his hunting targets are small. Only in this way will his sighting in be most accurate. For example, the 110-grain .30/06 has a point of impact 1" high at 200 yards, but the 220-grain bullet has a point of impact 2" low, a difference of 3". This difference does not matter too much for large game such as deer, but it is significant for target shooting, or it would be significant for small varmint shooting. For the most precise shooting, you should resight every time you change bullet weights or bullet characteristics. Since big-game hunting is not that precise, resighting is not necessary for this type of hunting. For example, if you are shooting a .30/30, and sight it in at 25 yards, the point of impact with 150-grain bullets is $2\frac{1}{2}"$ high at 150 yards and 2" high with 170-grain bullets, not enough to make any difference. Or if you are shooting a .308 sighted in at 25 yards, the point of impact is 2" low at 250 yards with 110-grain bullets and 7" low with 200-grain bullets, still not enough to make a big difference in big-game hunting, but a significant difference in varmint shooting. Therefore, whether you sight in every time you

change bullets and/or cartridges will depend upon the precision you need.

Try to do your sighting in under calm wind conditions. This is especially true if the shooter is sighting in not at 25 yards but at long ranges, or if he needs maximum precision, as in target shooting. Actually, wind does not make too much difference at 25-yard ranges for hunting purposes, but since errors at 25 yards are multiplied as one reaches out to farther and farther ranges, it is better not to have errors to multiply. Obviously, the stronger the wind, the greater the problem. And winds crossing at a 90° angle cause more problems than winds quartering from either side. (See a succeeding section on wind allowance.)

A benchrest provides the best support for sighting in, but if one is not available, *sight in in a prone position, using a padded rest for the forend of the rifle.* It is necessary that the gun rest on a padded surface, since recoil tends to push the barrel away from a hard surface.

With these general considerations in mind, what is the procedure in sighting in?

1. Place a target at 25 yards, and fire three test shots.

2. Draw lines between the three bullet holes and mark the center of the group. Measure the exact horizontal and vertical distance (in inches) the group center is off from the center of the bullseye. The windage correction needed is the horizontal distance, the elevation correction needed is the vertical distance.

3. Change the sight settings to make the needed windage and elevation corrections. With a telescope sight with $\frac{1}{4}$ -minute graduations on the dial, moving the dial one gradation will correct the line of sight $\frac{1}{16}$ " at 25 yards. (See the previous section under telescope sights on adjusting for windage and elevation.) The same principle applies to micrometer receiver sights. Find out how much adjusting the sight one gradation moves the point of impact at 25 yards, and adjust elevation and windage accordingly. For iron sights without micrometer adjustments, move the rear sight in the direction needed by whatever means are provided for that sight, or with a punch and hammer if necessary. It may take some time to adjust iron sights correctly. (See the previous sections on adjusting open rear sights under the general subject of iron sights.) With iron sights, you may have to shoot several groups of three shots, until the necessary adjustments are made.

4. With all types of sights, check the adjustments by firing a group of three shots once more. If the group is still off, adjust accordingly.

Correction for Wind

All wind has some effect on the flight path of the bullet, but whether or not the effect is significant will depend upon the type of shooting (whether target or hunting), the range (wind effects are greater at long ranges), the shape of the bullet and its ballistics, and the direction the wind is blowing. If a horizontal clock face is used in describing the direction of the wind, with the

shooter at the center of the face and the target at 12 o'clock, a 3-o'clock wind would come directly from the right, a 6-o'clock wind would come directly from the rear, and a 9-o'clock wind would come directly from the left.

For the man with a rifle, when the wind is from 3 o'clock or 9 o'clock its effect is greatest. As the angle diminishes, the effect of the wind is less pronounced. Winds from 1, 5, 7, or 11 o'clock require about half the correction needed for a wind of the same speed blowing from 9 or 3 o'clock. Winds from 2, 4, 8, and 10 o'clock have about $\frac{7}{8}$ of the sideward force of 3 or 9-o'clock winds of the same velocity.

The first task in making wind corrections is to judge the velocity of the wind. The table helps make estimations of wind velocity.

Judging Wind Velocity

| | |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 mph | Hardly appreciable; cannot be felt. |
| 2-5 mph | Very light breeze. At 3 mph, there is very little drift to smoke, and you may be able to feel a slight breeze on your cheek. At 5 mph, breeze on your cheek is definitely apparent. |
| 10-12 mph | A rather strong breeze. Leaves are blowing along ground, light-weight flags are beginning to be extended from poles. |
| 14-18 mph | Quite a strong breeze. At 15 mph, dirt and loose paper are raised into the air; small loose branches are moved along the ground. |
| 20-25 mph. | A hard, strong wind. We pull our hats and lean against it. At 20 mph, the wind sways small bushes and trees. Experienced shooters cease firing. |
| Over 30 mph | A gale too strong for successful rifle shooting. |

How much effect does the wind have on the trajectory of a bullet? This depends upon many factors, but the following table gives some drift figures for wind traveling at 6.8 mph at 90° angles across of line of sight.

Drift Effect of Wind Blowing 6.8 mph at 90° Across Line of Sight

| Caliber | Bullet | Muzzle Vel. | Wind Drift in Inches | | | |
|------------|---------|-------------|----------------------|-------------|-------------|-------------|
| | | | 100 yds. | 200 yds. | 300 yds. | 400 yds. |
| .220 Swift | 48 gr. | 4.40 fps | .66" | 2.65" | 5.95" | 10.6" |
| .250 Sav. | 87 gr. | 3000 fps | .62" | 2.47" | 5.50" | |
| .270 | 100 gr. | 3540 fps | .50" | 2.00" | 2.00" | 8.00" |
| .270 | 130 gr. | 3120 fps | .45" | 1.80" | 4.05" | 7.20" |
| .30/06 | 110 gr. | 3380 fps | 1.04" | 4.18" | 9.40" | |

Here are some other figures on what wind will do. A .22LR bullet with a muzzle velocity of 1,100 fps will be blown off the aiming point 3.6" at 100 yards and 14.4" at 200 yards by a 10 mph crosswind (see the table). A similar wind will blow a .30/06 180-grain Silvertip bullet off its course approximately 8" at 400 yards. A 30 mph wind will blow it off its course 12" at 200 yards and 24" at 400 yards. This means considerable correction for high winds at long ranges.

Some types of bullets are affected more by wind than others. The better the bullet retains its velocity over long ranges, the less it is affected by the wind.

Table of Wind Allowance**.22 Long Rifle. Cartridge, 40-Grain Bullet. M.V. 1100 f.s.**

| | | Inches and Minutes Bullet is Deflected | | | | | |
|-------------------------------------|----------------|----------------------------------------|------|---------------------------------------|-------|--------------------------------|------|
| Distance | Miles per Hour | By 1, 5, 7, and 11 o'Clock Winds | | By 2, 4, 8 and 10 o'Clock Winds | | By 3 and 9 o'Clock Winds | |
| | | Inches | Min. | Inches | Min. | Inches | Min. |
| 50 Yards 1 Minute = ½ Inch | 5 | .22 | .45 | .38 | .77 | .45 | .9 |
| | 10 | .45 | .90 | .78 | 1.57 | .90 | 1.8 |
| | 15 | .67 | 1.35 | 1.19 | 2.38 | 1.35 | 2.7 |
| | 20 | .90 | 1.80 | 1.57 | 3.15 | 1.80 | 3.6 |
| 100 Yards 1 Minute = 1 inch | 5 | .90 | .90 | 1.57 | 1.57 | 1.80 | 1.8 |
| | 10 | 1.80 | 1.80 | 3.15 | 3.15 | 3.60 | 3.6 |
| | 15 | 2.70 | 2.70 | 4.82 | 4.82 | 5.40 | 5.4 |
| | 20 | 3.60 | 3.60 | 6.30 | 6.30 | 7.20 | 7.2 |
| 200 Yards 1 Minute = 2 Inches | 5 | 3.60 | 1.80 | 6.30 | 3.15 | 7.20 | 3.6 |
| | 10 | 7.20 | 3.60 | 12.60 | 6.30 | 14.40 | 7.2 |
| | 15 | 10.80 | 5.40 | 18.90 | 9.45 | 21.60 | 10.8 |
| | 20 | 14.40 | 7.20 | 25.20 | 12.60 | 28.80 | 14.4 |

Table is approximately correct for .22 L. R. High-Speed Cartridges also.

Long, heavy, sharp-pointed bullets with superior sectional densities are affected less than short, light, round-nosed, flat-nosed, or hollow-point bullets with low sectional densities. This is why the hunter should use slightly heavier and pointed bullets under strong wind conditions, provided the heavier bullet has as long range as needed. Boat-tail bullets also buck the wind better than others.

A formula for wind compensation which gives the minutes of angle (MOA) required to compen-

sate for wind blowing at 90° to the bullet's path is given below.

$$\frac{\text{Range in Hundreds of Yds} \times \text{Wind Velocity in mph}}{\text{A Set Constant For Each Cartridge Load}} = \text{Minutes of Angle}$$

For example, if the shooter is using a .30/06 M-2 cartridge, the set constant is 10. If the range is 200 yards, and the wind velocity is 10 mph from the left, the correction needed is:

$$\frac{2 \times 10}{10} = 2 \text{ minutes of angle into the wind,} \\ \text{or 4'' at the 200 yards}$$

Shooting at Angles Uphill or Down

When a target is at a considerable range above or below the level of the shooter, the tendency is to shoot high, or overshoot, because the bullet drop is over the horizontal range and not over the greater distance of the slant range, so the total pull of gravity is not able to deflect the bullet downward as much.

If, in shooting uphill, the gun is at an angle of 10° above the line of sight, this places the sights right on the target. On the other hand, if the gun angle is at 10° + 30° (the angle uphill), the result is the trajectory of the bullet passing over and beyond the target. The same thing would happen if shooting at a 30° angle downhill as well. This means the hunter must hold low. The table shows the relationship between the "slant range" (or actual distance over which the bullet passes) the "horizontal range" (which governs the bullet's drop).

Relationship Between Estimated Slant Range and Horizontal Range

| Angle of Slope (Up or Down) | Divide Estimate Range by |
|--------------------------------|-----------------------------|
| 0° | 1.0 |
| 5° | 1.0 |
| 10° | 1.02 |
| 15° | 1.04 |
| 20° | 1.06 |
| 25° | 1.10 |
| 30° | 1.15 |
| 40° | 1.31 |
| 45° | 1.41 |

Another way of calculating the same thing is with the following formula:

Horizontal Range = Estimated Slant Range ×
Cosine of Angle Elevation

Let us see how this works with the table above and with the formula. Suppose one's angle of elevation = 30° uphill, and the estimate slant range = 350 yards. By the table above:

$$\text{Horizontal Range} = \frac{350}{1.15} = 305 \text{ yards}$$

By the formula above:

$$\text{Horizontal Range} = 350 \times \text{Cosine } 30^\circ = 350 \times .87 = 305 \text{ yards.}$$

Range Estimation

Several ways of learning to estimate ranges will be discussed here.

1. Memorize distances so you can compare distances while hunting.
2. Estimate range with your scope reticule.
3. Use a range-finding scope.

The best way to learn to estimate ranges is by memorizing distances with which you can compare ranges while hunting. Then practice your range estimation. Everyone knows, for example, that a football field is 100 yards long. Go look at it; see how long 100 yards is when you are looking over the flat ground. Then try to visualize 100 yards over flat ground, over a valley or draw, or canyon, and through bushes. Go to different spots and estimate ranges. If you are not sure of the distance, pace it off. (But first measure your stride to learn how to pace off approximately 3' per stride.)

After you are good at estimating 100-yard ranges, try estimating distances of 200, 300, and 400 yards, if you are likely to be shooting this far. By remembering the length of a football field and being able to judge 100 yards accurately, you can then begin to estimate multiples of 100 yards.

The only way to become expert at range estimation is to practice. Take walks and estimate ranges between widely separated telephone poles. Estimate distances to trees, to houses, to bushes, to other people. Then check your estimates by pacing off the distance, and you'll soon discover you are an expert.

The second way to estimate ranges is by using your scope reticle. But to do this you have to know how many minutes or fractions of minutes of angle your reticle covers. For example, if you have a scope with a 4-minute dot reticle, you know this will cover 4" of target at 100 yards, 8" at 200 yards, or 16" at 300 yards. If an adult buck deer measures about 18" from withers (points between shoulders) to his brisket (belly line), and your dot covers this entire vertical area, you know your buck is slightly over 300 yards away. If your dot covers about half the distance, your buck is a little over 200 yards away.

The same principle applies if you have a post reticle. An excellent post reticle subtends (covers) about 4 to 6 minutes of angle (4" to 6" at 100 yards). By knowing the size of your animal, and the post, you can quickly determine the range of an animal. While usually slimmer than a post reticle, crosshairs can also be used. An excellent crosshair for a 2½X hunting scope is about 2 minutes, or subtends 2" at 100 yards. So if you are gopher shooting (total measurement standing full length is about 8"), and the horizontal crosshair subtends his entire body, you know the range is about $8" \div 2"/100 \text{ yards} = 400 \text{ yards}$. Furthermore, suppose you know your bullet will drop 8" at that distance. Hold a crosshair's width over the middle of the body of the gopher, and you should hit dead center. Thus, the reticle can be used not only to determine range but also to determine how far to hold over the target when necessary.

You should know the measurements of various animals. The table shows some common animals' measurements.

Measurements of Common Animals

| Animal | Where Measured | Distance |
|---------------|----------------------|----------|
| Elk | Shoulder to brisket | 24" |
| Deer | Shoulder to brisket | 18" |
| Bear | Shoulder to brisket | 18" |
| Sheep | Shoulder to brisket | 22" |
| Antelope | Shoulder to brisket | 14" |
| Mountain Lion | Shoulder to brisket | 12" |
| Coyote | Shoulder to brisket | 9" |
| Chuck | Standing full length | 18" |
| Gopher | Standing full length | 8" |

The third way of estimating range is by using a range-finding scope. As discussed in the previous section on reticules, some reticules are designed as range-finder reticules. The simplest is No. 14, shown in the figure on types of reticules. If the two horizontal crosshairs are subtended at a 6-minute angle, they will cover 6" at 100 yards, or 18" at 300 yards. If they cover only half the 18" body of a deer from shoulders to belly, you know the range is 150 yards.

Reticule No. 8, the Redfield Accu-Range, was also discussed in the previous section. On this type, the horizontal wires are adjusted until they subtend the deer's body, and then the range is read directly. But it is important to note that a correct range reading is obtained on this reticule only if the animal's body

is 18" and the two horizontal crosshairs are correctly adjusted to fit the body 18" apart. If a small animal is the target, such as a coyote (measuring 9"), the correct range is only half of the scale reading. The table shows how to calculate the correct yardage using the Redfield Accu-Range when the animal's measurement is less or more than 18".

Calculating Yardage with Redfield Accu-Range

| Animal Measurement | Yardage |
|--------------------|----------------------------------|
| 6" | $\frac{1}{3}$ of scale reading |
| 9" | $\frac{1}{2}$ of scale reading |
| 12" | $\frac{2}{3}$ of scale reading |
| 15" | 82% of scale reading |
| 18" | direct scale reading |
| 21" | scale reading plus 17% |
| 24" | scale reading plus $\frac{1}{3}$ |
| 27" | scale reading plus $\frac{1}{2}$ |
| 30" | scale reading plus $\frac{2}{3}$ |
| 36" | twice scale reading |

Of course, these rapid-fire calculations are virtually impossible under actual hunting conditions. Therefore, this type of reticule does not seem as wise a choice for hunting as some others that can also be used in range estimation.

The Realist Autorange (No. 11 in the figure on reticules) was also discussed in the section on reticules. Since this involves an automatic adjustment for range when the horizontal crosshairs are adjusted to subtend the animal, it is fast and accurate.

Shot Placement Areas for Big Game

No hunter likes to cripple game, which may run off to die. But some hunters are careless about their aim or lack sufficient understanding to shoot in a vital area. For this reason, some knowledge of where to aim to assure a quick kill is essential.

Where is the best spot to aim on a deer? The best place of all is the lung area back of the shoulder. The reasons are several:

1. This is the largest, most vital area to aim at. The chances of getting an accurate hit are far greater than if the hunter aims at a vital but small target, such as the brain, spinal column, or jugular vein. It is too easy to miss a brain or spinal shot, and to only wound the animal. Then you have to track the wounded beast for miles.

2. A clean hit with an adequate bullet, one that has sufficient weight and expanding qualities, usually means a one-shot kill. Death may not be instantaneous, but it is very fast. The bullet tears up the lungs, causing terrific bleeding and shock to the whole system, and it usually ruptures the heart or stops it.

3. Strangely, a lung shot is better than a heart shot. The heart is small and low. If your bullet goes very low, you will miss the animal or only break a foreleg. Also, a large deer can be shot in the heart and still run several hundred yards before falling dead, making the hunter think he has missed it and leave a dead animal in the woods.

4. A lung shot ordinarily does not destroy much edible meat. A spine shot destroys a lot of deer

chops; a shoulder shot splinters bone into some fine roasts.

There are several spots a hunter must avoid hitting if at all possible. (1) A leg (not a shoulder), low on the leg. The animal can have a leg blown off or a broken leg and suffer terribly, but escape. (2) A paunch or gut shot. The deer may have his intestines and stomach literally blown out and still keep going. If the hunter does find him, the meat is often badly tainted. (3) A ham shot, primarily because it destroys a lot of edible meat. If the shot misses the hip or leg bone, it will never stop the animal. If it hits the hip, he will go down only wounded, and have to be dispatched quickly, but a lot of meat will still be destroyed. If the shots hit the lower leg, the animal will usually go down, then get up and keep traveling.

The basic principles just outlined apply to many other animals as well: antelope, mountain sheep and goats, elk, caribou, and moose. The best shot placement for these animals is the lung area. Try to avoid hitting the shoulder of an elk, caribou, or moose, particularly with the type of rapid expansion bullets usually selected for this game. These are tough animals with large bones. The shoulder bone may turn the fast-expanding bullets designed for thin-skinned game such as deer. So, shoot behind the shoulder not right into it.

The game that must be shot into the shoulder to be stopped are dangerous bears: grizzlies, polar bears, and Alaskan brown bears. The first task of the hunter, in this instance, is to stop the animal,

and by holding to break one or both shoulders. True, this only wounds the animal unless the bullet also enters the lungs or heart, but the bear is stopped and can be readily dispatched with quick finishing shots. On angling shots, the hunter can hold to break the near shoulder and have the bullet penetrate the chest cavity to go through the heart-lungs area or also break the opposite shoulder. Of course, high-velocity, heavy, tough, deep-penetrating bullets must be used for this type of hunting.

How to Lead a Moving Target

There are basically two methods of hitting a moving target. One is with the fast swing; the other is with the sustained lead. In the *fast swing*, the hunter aims exactly as does the shotgunner on waterfowl: he starts the swing behind the animal, swings in the direction the animal is moving, but at a somewhat faster rate than the animal is traveling, pulls ahead of the animal and, as he keeps his rifle moving, squeezes off the shot. The secret of this method is to follow through in the direction the animal is moving, keeping the rifle moving as the rifle barrel gets ahead of the animal and the shot is squeezed off. If the shooter stops or slows his swing to check his sight picture, he will shoot behind a fast-running animal.

The second method is the *sustained lead*. In using this technique, the hunter must decide how much to lead the target, place his sight the correct distance in front of the game, and then keep swinging his rifle at the same speed and in the same direction

the animal is moving, so as to sustain the correct lead. The shot is fired without stopping the swing.

The question often asked is: How much do you lead a running animal? Of course, this depends on the range, the bullet's velocity, how fast the animal is running and at what angle, and the reaction time of the hunter between the time he decides to shoot and the time he actually pulls the trigger. The fast swing or sustained lead will ordinarily take care of the problem of the angle the deer is running, and of the hunter's reaction time, because the rifle continues to swing along the path of the animal while the hunter decides to shoot and actually pulls the trigger. The variables remaining are the bullet's velocity (which determines how long it takes the bullet to travel from muzzle to target), the range, and the speed of the animal. The time (in seconds) it takes for the bullet to reach the target is:

$$\begin{array}{l} \text{Time} \\ \text{(in seconds)} \end{array} = \frac{\text{Distance to Target (in feet)}}{\text{Average Bullet Velocity (in feet per second)}}$$

Of course, the bullet gradually slows down after firing, so its velocity can be approximately calculated as an average of muzzle velocity and velocity at the time it hits the target. Let's see how this works. Suppose the hunter is using a .30/06 with a 150-grain bullet, muzzle velocity of 2,970 fps, and velocity at 200 yards of 2,400 fps, on a deer crossing at 30 mph at 200 yards away. How long will it take for the bullet to reach the target?

The first task is to calculate the average velocity of the bullet.

$$\begin{aligned}\text{Average Velocity} &= \frac{2,970 \text{ fps} + 2,400 \text{ fps}}{2} \\ &= \frac{5370}{2} = 2,685 \text{ fps}\end{aligned}$$

$$\begin{aligned}\text{Time} &= \frac{\text{Distance (in feet)}}{\text{Average Velocity (in fps)}} \\ &= \frac{200 \text{ yds} \times 3' / \text{yds.}}{2,685 \text{ fps}}\end{aligned}$$

$$\text{Time} = \frac{600'}{2,685 \text{ fps}} = .22 \text{ sec.}$$

Once you know how long it will take the bullet to get to the target, it is easy to calculate the lead distance required according to the speed of the game.

$$\begin{aligned}\text{Lead Distance (in feet)} &= \\ &\frac{\text{Time (seconds)} \times \text{Speed of Deer (in mph)}}{3,600 \text{ sec./hr.}} \\ &\quad \times 5,280' / \text{mile}\end{aligned}$$

In the case sighted above, the answer is as follows:

$$\begin{aligned}\text{Lead Distance (feet)} &= \\ &\frac{.22 \text{ sec.} \times 30 \text{ mph} \times 5,280' / \text{mile}}{3600 \text{ sec./hour}} \\ \text{Lead Distance} &= \frac{.22 \times 30 \times 5,280'}{3,600} = 9.68'\end{aligned}$$

A deer about 5' long should be led about two body lengths ahead of the desired aiming point. Of

course, these solutions assume the deer is running at a 90° angle across at about 30 mph.

Handloading Rifle Cartridges

Case Sorting and Inspection

Before starting to load, all cartridge cases should be sorted and inspected. Separate the cases into groups according to caliber, make, and type. It is helpful if those purchased together have been kept separated by lots, so you know that those of the same brand name and date of purchase, and those which have been reloaded a particular number of times, are loaded together. Check all cases for splits, cracks, or other signs of excessive fatigue. Discard those not in good condition. Those cases that have been lengthened after numerous firings and reloadings need trimming at the mouth. Also, new or once-fired cases have sharp edges inside the case mouth. These edges are trimmed by a process known as *chamfering*. Hold the case in one hand while you lightly turn a reamer in the case mouth with the other hand. Be certain not to remove much material or a sharp knife edge will be cut on the edge of the case.

Selecting the Components

Reloading handbooks have charts that recommend the right components for your cartridge. Make certain you select the proper bullet diameter and primer size for your cartridge case. Bullet weight

should be selected according to recommendations and the type of shooting you are doing. Generally speaking, long-range shooting requires lighter bullets than short-range shooting. Pointed bullets do not lose velocity as fast as rounded or flat bullets. Hunting in brush and woods requires heavy, round-nosed bullets to minimize brush deflection. Large animals obviously require heavier bullet weights than small animals. Some bullets expand rapidly, others not at all, so jacket, design, and bullet material are important. For full information, see the discussion of "Bullets" in a previous section.

Powder type and amount must also be selected. If you are uncertain, use a starting load recommended for the caliber and bullet you have selected. Do not make the mistake of overloading the cartridge, or even of loading to the maximum if you are unfamiliar with the process or result.

Steps in Handloading a Rifle Cartridge

There are six mechanical operations involved in reloading a cartridge.

1. *Full-length resizing.* This involves reducing the stretched outside diameter of the case, including the neck, shoulder, and body.
2. *Decapping.* Removing the fired primer.
3. *Inside neck expanding.* Enlarging the diameter of the neck to receive and hold the bullet firmly.
4. *Priming.* Inserting a new primer.
5. *Charging powder.* Weighing the powder and pouring it into the case.

6. *Bullet seating.* Putting the bullet firmly into the case.

Usually, these six mechanical operations are performed in four basic steps. In actual practice, though, operations 1 and 2 (full-length resizing and decapping) are both accomplished in step 1. Inside neck expanding and priming (operations 3 and 4) are both accomplished in step 2.

Smallbore Rifle Matches

The following are excerpts from the National Rifle Association *Smallbore Rifle Rules*.^{*} For additional information and complete rules write to the NRA.

1. TYPES OF COMPETITION

1.1 Smallbore Rifle Match—Any match fired with small-bore rifles. A match may consist of one or more stages.

- (a) Gallery or Short Range, fired at ranges usually of 50 feet or 75 feet, but not necessarily fired indoors.
- (b) Mid-Range, fired at ranges usually of 50 yards, 50 meters, and 100 yards; but not necessarily fired outdoors.
- (c) *Long Range*, fired outdoors at ranges greater than 100 yards.

1.2 Open Match—A match open to anyone. An open match may be limited to citizens of the United States or to members of the National Rifle Association of America. Such limitation must be stated in the program.

1.2.1 (Blank)

1.2.2 National Matches—The National Matches are the combined NRA National Championships and the National Trophy Matches.

^{*} Grateful acknowledgment is made to the NRA for permission to publish these excerpts.

1.3 Restricted Match—A match in which competition is limited to specified groups, i.e., juniors, women, police, civilians, veterans, etc.; or to specified classes, i.e., Masters, Experts, Sharpshooters, Marksmen, etc.

1.4 Classified Match—A match in which prizes are awarded to the winners and to the highest competitors in several specified classes, such as in Masters, Experts, Sharpshooters, Marksmen. The classification of competitors may be accomplished by the National Classification System (Sec. 19) or by other means. The program for classified matches must specify the classes in which awards will be made.

1.5 Invitational Match—A match in which participation is limited to those who have been invited to compete.

1.6 NRA Competition—Competition sanctioned in advance of firing by the National Rifle Association. The program, range facilities and officials must comply with standards established by the NRA. (See Section 21.)

1.7 League Competition—A form of competition in which teams compete one against another under a pre-arranged schedule in a series of matches. Leagues usually provide for each team to fire against each other team at least once during the league season. Final standings are usually determined by the percentage of matches won by those who fired the required number of matches. Special prizes may be awarded for high individual or team score.

1.8 Squadded Individual Match—A match in which each competitor is assigned a definite relay and target by the statistical office. Failure to report on the proper relay or firing point forfeits the right to fire. All entries must be made before firing commences in that match, except when otherwise stated in the tournament program. (Rule 9.20)

1.9 Unsquadded Individual Match—A match in which the competitor is not assigned a definite relay or target by the statistical office. The competitor reports to the range officer within the time limits specified in the program and is then assigned to a target and a relay in which to fire.

1.10 Re-Entry Match—A match in which the competitor is permitted to fire more than one score for record; one or more of the highest scores being considered to determine the relative rank of competitors. The number of scores which may be fired, and the number of high scores to be considered in deciding the relative rank of competitors must be specified in the program.

1.11 Squadded Team Match—A match in which the teams are assigned a definite time to fire. Teams may be assigned one or more adjacent targets. All entries must be made before firing commences in that match. In outdoor competitions the entire team must report and fire as a unit, unless the program specifically provides otherwise (except in the case of team matches fired under ISU Rules).

1.12 Unsquadded Team Match—A match in which the teams may report at the firing line at any time within the limits specified in the program, targets being assigned by the range officer. In outdoor competitions, the entire team must report and fire as a unit, unless the program specifically provides otherwise.

1.13 Aggregate Match—An aggregate of the scores from two or more matches. This may be an aggregate of match stages, individual matches, team matches, or both, provided the tournament program clearly states the matches which will comprise the aggregate. Entries in aggregate matches must be made before the competitor commences firing in any of the matches making up the aggregate match.

1.13.1 Tournament—A tournament is a series of matches covered by an official program. Such matches may be all individual matches, all team matches or a combination of both; they may be all fired matches or a combination of fired and aggregate matches. A tournament may be conducted on one day, or successive days or may provide for intervening days between portions of the tournament, such as tournaments programmed for conduct over more than one weekend.

2. ELIGIBILITY OF COMPETITORS

Individuals

2.1 Members of the National Rifle Association—Any individual member in good standing, including Benefactors, Patrons, Endowment, Life, Annual, Associate, Non-Resident and Junior members.

2.2 Civilian—Any civilian including all members of the Reserve Officer Training Corps (ROTC, NROTC, and AFROTC), personnel of the State Security Forces (e.g., State Guard organizations having no federal recognition), retired members of each of the several services comprising the Armed Forces of the United States, and members and former members entitled to receive pay, retirement pay, retainer pay or equivalent pay, are classified as civilians except as noted in the example below. All competitors who

are enrolled undergraduates of any of the service academies will be considered as civilians and may compete in collegiate and ROTC categories.

Individuals of any Reserve or National Guard component who, *during the present calendar year*, have not competed as National Guard (2.5) or Regular Service (2.6) or Reserve component (2.7) *and* have not been provided Service support for competition (in the form of weapons, ammunition, payment of travel or other expenses), wholly or in part, may fire as civilians. The provision of weapons and ammunition for a specific competition (i.e., National Matches or NBPRP Regional Leg Matches), when such is available to both military and civilian competitors, is not considered Service support under this rule.

Unless specifically authorized to do so by the tournament program, members of the regular Army, Navy, Air Force, Marine Corps, Coast Guard; members of the reserve components on active duty; retired personnel of the several services comprising the Armed Forces of the United States on active duty; or police (rule 2.4) are not permitted to compete as civilians.

2.3 Junior Competitor—Any boy or girl who has not reached his or her nineteenth (19th) birthday who is either an individual NRA member or a member of an NRA affiliated club. A junior's age at the start of a tournament, league or match series will govern his eligibility.

Example: A junior whose 19th birthday will be June 19th enters a tournament, the matches of which will be fired on June 18, 19, and 20. Because he is a junior at the start of this tournament he is eligible to continue the tournament on June 19 and 20.

2.4 Police—Any regular, full time member of a regularly constituted law-enforcement agency, including the enforcement officers of the several departments of the United States Government; State, County or Municipal Police Departments; Highway Patrols, Penal Institution Guards; full time salaried Game Wardens, Deputy Game Wardens and Deputy Sheriffs; regularly organized Railroad or Industrial Police Departments, Bank Guards and Armored Truck and Express Company Guards.

Special Officers, Honorary Officers, Civilian Instructors, Deputy Sheriffs, Deputy Game Wardens or Police Officers who are not on a full time, full pay basis in a single department are not eligible to compete as police.

2.5 National Guard—Federally recognized officers or enlisted men of the Army National Guard, the Air National

Guard, or the Naval Militia of the several states, territories, the District of Columbia or the Commonwealth of Puerto Rico, who are not on extended active duty.

2.6 Regular Service—Officers or enlisted men of the Regular United States Army, Navy, Air Force, Marine Corps, Coast Guard, and members of reserve components thereof, who are on extended active duty; provided the term "reserve components" shall include Army National Guard and Air National Guard called into federal service and while in such status.

2.7 Reserve Components—Officers and enlisted men of any reserve components of the Armed Forces, exclusive of the Army National Guard and the Air National Guard of the United States, not on extended active duty.

2.8 College—Regularly enrolled undergraduate students who comply with the eligibility rules of their institution. An undergraduate is a student who has not received his bachelors degree.

Unless specifically authorized to do so by the tournament program, members of the regular Army, Navy, Air Force, Marine Corps, Coast Guard; members of the reserve components on active duty; retired personnel of the several services comprising the Armed Forces of the United States on active duty; or police (rule 2.4) are not permitted to compete as collegiate.

2.9 School—Regularly enrolled undergraduate students of any primary or secondary school, who comply with the eligibility rules of their institution.

Teams

2.10 Team Representation—No competitor may fire on more than one team in any one match.

2.11 Affiliated Club Teams—Members of such teams must (a) have been active, fully paid members of the club for a period of at least 10 days immediately prior to the date of the competition; (b) the club must be affiliated with the NRA and in good standing.

2.12 State Association Teams—Members of such teams must be individual members of the state rifle and/or pistol association represented, if such state association provides for individual memberships, or be members of a rifle and/or pistol club which is affiliated and in good standing with the state association concerned at the time of the competition. State association teams permitted to enter the competitions by the tournament program conditions must be authorized

and accredited by the association for that tournament. Authorization shall be signed by the Association President, Vice President or Secretary. Such state associations must be affiliated and in good standing with the NRA at the time of the competition.

(EXPLANATORY NOTE: *Teams representing State Associations, Leagues and other associations (composed of more than one club) are not club teams. Such teams may enter NRA sanctioned matches only when the program specifically authorizes such entry.*)

2.13 Regular Service, National Guard or Other Armed Forces Reserve Teams—Members of such teams must have been commissioned or enlisted members of their respective service for a continuous period of at least thirty days immediately preceding the day of the competition. Army National Guard, Air National Guard, and the Naval Militia personnel may be combined into a single team.

2.14 Police Teams—Members of such teams must have been regular full time members of their respective organization and in active service for a continuous period of at least thirty days immediately preceding the day of competition.

2.15 Civilian Club Teams—Members of such teams must comply with the requirements of Rule 2.11.

2.16 College Teams—Members of such teams must comply with the requirements of Rule 2.8.

2.17 School Teams—Members of such teams must comply with the requirements of Rule 2.9.

2.18 Junior Club Teams—Members of such teams must be regularly enrolled members who have not reached their 19th birthday of a junior club, junior patrol or junior division of a senior club which is duly and properly affiliated and in good standing with the NRA.

2.19 Fraternal and Veteran Organization Teams—Members of such teams must be active "paid-up" members of the Chapter or Post which the team represents.

2.20 Residence—In those matches which are limited to residents of any specified geographical area a "resident" is defined as:

- (a) A person who lives within a specified area for at least thirty days immediately prior to the day of the match, whether or not his employment is at a place requiring him to commute or travel into some other area.

- (b) A person who has been regularly employed within the specified area for at least thirty days immediately prior to the day of the match and who has maintained domicile in that area for the same period of time, although his permanent residence is located outside the specified area.
- (c) Military, Naval, and Air Force Personnel: The place of residence of members of the Military, Naval and Air Force establishments on active duty is defined as the place at which they are stationed by reason of official orders, provided they have been so stationed within the specified area for a period of at least thirty days immediately prior to the day of the match. In the case of retired, Reserve, or National Guard personnel not on active duty, the provisions of Paragraphs (a) and (b) will apply. Naval personnel assigned on sea duty qualify for residence in the area which is the usual base or home port of the unit to which attached.
- (d) Federal and State Law Enforcement Officers: The provisions of Paragraph (c) will apply.

3. EQUIPMENT AND AMMUNITION

It is the intent of this section to define authorized equipment. It is not the intention to restrict in any way the legal use of such equipment.

3.1 The Rifle—The rifle authorized for use in smallbore rifle matches is the .22 caliber rimfire chambered for cartridges commercially catalogued as the “.22 Short,” “.22 Long” or “.22 Long Rifle” cartridges. There are no restrictions on the barrel length or over-all weight of the rifle and accessories. No portion of the rifle or any attachment to the rifle shall extend more than three inches beyond the rear of the shooter's shoulder. The trigger pull must be capable of lifting three (3) pounds. The same rifle must be used throughout all stages of any one match (except aggregate and free rifle) except in the case of a malfunction or disabled rifle, when the competitor may change rifles with permission of the Chief Range Officer.

3.2 Any Rifle—A rifle authorized for use in smallbore rifle matches using cartridges commercially catalogued as the “.22 Short,” “.22 Long” or “.22 Long Rifle” cartridges. There are no restrictions on the barrel length or overall weight of the rifle and accessories. No portion of the rifle or any attachment to the rifle shall extend more than three inches beyond the rear of the shooter's shoulder. A butt plate

conforming with NRA Rule 3.15 may be used. "Around the body," or "around the shoulder" hooks are not permitted. The same rifle must be used throughout all stages of any one match (except aggregate and free rifle) except in the case of a malfunction or disabled rifle when the competitor may change rifles with permission of the Chief Range Officer. In NRA Three Position Course shooting this rule will govern the conduct of the match and may not be waived by the match sponsor.

3.3 Light Rifle—Any .22 caliber rimfire with not less than a three (3) pound trigger pull and which weighs not more than seven (7) pounds when equipped with sights.

3.7 Sights—Match conditions may specify any one of the following:

(a) *Metallic*—

- (1) Non-corrective: A rear sight (including tube sights) not containing a lens or system of lens. A colored filter, without magnification, may be attached to either front or rear sight.
- (2) Corrective: A rear sight on which may be attached a single lens or system of lens, not containing an aiming point, as a substitute or in addition to prescribed spectacles. A color filter, without magnification, may be attached to either the front or rear sight.

NOTE: Unless the match conditions specify otherwise, a sight as defined in either (1) or (2) above may be used.

- (b) *Telescopic*—Any sight or combination of sights containing lenses for the purpose of magnification.
- (c) *Any*—Any sight without restrictions as to material or construction.

3.17 Smallbore Ammunition—Rimfire cartridge commercially catalogued as the ".22 Short," ".22 Long" or ".22 Long Rifle," which have an over-all length not more than 1.1 inches and loaded with lead or alloy bullet of not larger than .23 inch diameter which weighs not more than 40 grains. Hollow point, tracer, incendiary or explosive bullets are specifically excluded from ammunition authorized for match use.

4. TARGETS

• **4.1 Official Targets**—In registered and approved rifle matches only targets bearing the words "Official National Rifle Association" and the eagle and shield insignia of the

Association or military targets issued by the armed services will be used without any alterations. Targets will be mounted only vertically on existing range hangers (frames) with the highest numbered bullseye(s) at the bottom.

Official Target Dimensions

50 Foot Target. Single bullseye, 5 bullseye, 10 bullseye and 11 bullseye. 6, 7, 8, 9 and 10 rings black. Target (Paper) No. Junior Single Bullseye A-1, (Paper) Junior 5 Bullseye A-2, (Tagboard) Single Bullseye A-1T, (Tagboard) Junior 5 Bullseye A-2T, (Tagboard) Single Bullseye A-4, (Tagboard) 5 Bullseye A-5, (Tagboard) 10 Bullseye A-16, (Tagboard) 11 Bullseye A-17.

| | | | |
|--------------|-----------|-------------|--------------|
| 10 ring..... | .150 inch | 7 ring..... | 1.150 inches |
| 9 ring..... | .483 inch | 6 ring..... | 1.483 inches |
| 8 ring..... | .817 inch | 5 ring..... | 1.817 inches |

50 Foot Target. 12 Bullseyes (2 for sighting). 50 Meter International Smallbore Rifle Target reduced for firing at 50 feet. 3 to 10 rings black. Target (Tagboard) No. A-36.

| | | | |
|-------------|-----------|-------------|--------------|
| 10 dot..... | .008 inch | 5 ring..... | .994 inch |
| 9 ring..... | .193 inch | 4 ring..... | 1.195 inches |
| 8 ring..... | .393 inch | 3 ring..... | 1.395 inches |
| 7 ring..... | .593 inch | 2 ring..... | 1.595 inches |
| 6 ring..... | .793 inch | 1 ring..... | 1.796 inches |

50 Foot Light Rifle Target. 6 bullseyes (1 for sighting). 8, 9 and 10 rings black, with white dot in center of 10 ring. Target (Tagboard) No. A-32.

| | | | |
|-------------|--------------|-------------|--------------|
| White Dot.. | .218 inch | 8 ring..... | 1.874 inches |
| 10 ring.... | .439 inch | 7 ring..... | 2.656 inches |
| 9 ring.... | 1.187 inches | 6 ring..... | 3.374 inches |

75 Foot Target. Single bullseye, 5 bullseye and 10 bullseye. 6 to 10 rings black. Target (Tagboard) No. Single Bullseye A-6, (Tagboard) 5 Bullseye A-7, (Tagboard) 10 Bullseye A-8.

| | | | |
|-------------|--------------|-------------|--------------|
| 10 ring.... | .335 inch | 7 ring..... | 1.835 inches |
| 9 ring.... | .835 inch | 6 ring..... | 2.335 inches |
| 8 ring.... | 1.335 inches | 5 ring..... | 2.835 inches |

50 Yard Target. Single bullseye, 2 bullseye, 3 bullseye and 5 bullseye. 7 through 10 rings black. Target (Paper) No. Single Bullseye A-9, (Paper) 2 Bullseye A-10, (Paper) 5 Bullseye A-12, (Tagboard) Single Bullseye A-9T, (Tag-

board) 2 Bullseye A-11, (Tagboard) 3 Bullseye A-34, (Tagboard) 5 Bullseye A-23.

| | | | |
|--------------|-------------|-------------|-------------|
| X ring..... | .39 inch | 7 ring..... | 3.89 inches |
| 10 ring..... | .89 inch | 6 ring..... | 4.89 inches |
| 9 ring..... | 1.89 inches | 5 ring..... | 5.89 inches |
| 8 ring..... | 2.89 inches | | |

50 Yard Target. 5 Bullseye. 50 Meter Target reduced for firing at 50 yards. 3.89 Diameter black. Target (Tagboard) No. 5 Bullseye A-27.

| | | | |
|-------------|--------------|-------------|--------------|
| X ring.... | .359 inch | 7 ring..... | 2.879 inches |
| 10 ring.... | .719 inch | 6 ring..... | 3.599 inches |
| 9 ring.... | 1.439 inches | 5 ring..... | 4.319 inches |
| 8 ring.... | 2.159 inches | 4 ring..... | 5.038 inches |

50 Yard Target. 5 Bullseye. 50 Meter ISU target reduced for firing at 50 yards. 4 to 10 rings black. Target (Tagboard) No. A-39.

| | | | |
|-------------|--------------|-------------|--------------|
| X ring.... | .016 inch | 5 ring..... | 3.424 inches |
| 10 ring.... | .426 inch | 4 ring..... | 4.024 inches |
| 9 ring.... | 1.025 inches | 3 ring..... | 4.624 inches |
| 8 ring.... | 1.625 inches | 2 ring..... | 5.223 inches |
| 7 ring.... | 2.225 inches | 1 ring..... | 5.823 inches |
| 6 ring.... | 2.824 inches | | |

50 Meter Target. 5 Bullseye. 4.27" Diameter black. Target (Tagboard) No. A-26.

| | | | |
|-------------|--------------|-------------|--------------|
| X ring.... | .393 inch | 7 ring..... | 3.148 inches |
| 10 ring.... | .787 inch | 6 ring..... | 3.936 inches |
| 9 ring.... | 1.574 inches | 5 ring..... | 4.723 inches |
| 8 ring.... | 2.361 inches | 4 ring..... | 5.510 inches |

50 Meter Target. 3 Bullseye. Target for International and NRA Three Position competition. 4 to 10 rings black. Target (Tagboard) No. A-20. Five Bullseye (Tagboard) A-49.

| | | | |
|-------------|--------------|-------------|--------------|
| X ring.... | .039 inch | 5 ring..... | 3.768 inches |
| 10 ring.... | .488 inch | 4 ring..... | 4.425 inches |
| 9 ring.... | 1.144 inches | 3 ring..... | 5.081 inches |
| 8 ring.... | 1.80 inches | 2 ring..... | 5.737 inches |
| 7 ring.... | 2.456 inches | 1 ring..... | 6.393 inches |
| 6 ring.... | 3.113 inches | | |

100 Yard Target. Single bullseye and 3 bullseye. 7 through 10 rings black. Target No. (Paper) Single Bullseye A-14. (Tagboard) Single Bullseye A-15, (Tagboard) 3 Bullseye A-25.

| | | | |
|--------------|----------|-------------|-----------|
| X ring..... | 1 inch | 7 ring..... | 8 inches |
| 10 ring..... | 2 inches | 6 ring..... | 10 inches |
| 9 ring..... | 4 inches | 5 ring..... | 12 inches |
| 8 ring..... | 6 inches | | |

200 Yard Target. Single bullseye. 8, 9 and 10 rings black.
Target No. (Paper) Single Bullseye A-21, (Paper) Center A-22. (Tagboard) Single Bullseye A-28.

| | | | |
|--------------|----------|-------------|-----------|
| X ring..... | 2 inches | 8 ring..... | 12 inches |
| 10 ring..... | 4 inches | 7 ring..... | 16 inches |
| 9 ring..... | 8 inches | 6 ring..... | 20 inches |

5. POSITIONS

5.6 Prone—Body extended on the ground, head toward the target. The rifle will be supported by both hands and one shoulder only. No portion of the arms below the elbows shall rest upon the ground or any artificial support nor may any portion of the rifle or body rest against any artificial support.

5.8 NRA Sitting—Weight of the body supported on the buttocks and the feet or ankles, no other portion of the body touching the ground. The rifle will be supported by both hands and one shoulder only. Arms may rest on the legs at any point above the ankles.

5.10 NRA Kneeling—Buttocks clear of the ground, but may rest on one foot. The rifle will be supported by both hands and one shoulder only. The arm supporting the rifle rests on the knee or leg. The elbow of the trigger arm will be free from all support. One knee must be touching the ground. A soft pad may be used if placed fully beneath the instep with the toes and knee touching the ground. The pad will be cylindrical, approximately 8 inches long and 4 inches to 6 inches in diameter.

5.11 Standing—Erect on both feet, no other portion of the body touching the ground or any supporting surface. The rifle will be supported by both hands and one shoulder only. The forward hand will be extended so the arm will be entirely free from touching or resting against the body. If the sling is attached to the rifle it must be in parade position. The hasty sling may be used only if specified in the program.

5.12 NRA Standing—Erect on both feet, no other portion of the body touching the ground or any supporting surface. The sling may be used. The rifle will be supported by both hands and one shoulder only. The elbow of the forward arm may be placed against the body or rested on the hip.

5.13 Any—Any position is where the rifle is supported only by the body and by which other competitors are not endangered.

7. COURSES OF FIRE

These courses are those most frequently found in NRA Competition programs but should not be considered the only courses which may be scheduled. Special courses may be developed by tournament sponsors and scheduled whenever desired but must be so stated in the tournament program.

These courses may be fired with either metallic or "any" (includes telescopes) sights. Separate matches may be scheduled for each type of sight.

• **7.1 Courses of Fire**—In 50 yard, 50 meter, 100 yard matches it is customary to change targets after each 20 shots. The "Time Limit" shall be the same for the first and second 20 shots, even though it is at the same distance.

The following are the courses and types of fire commonly found in competition. See rule 8.2 for time allowances.

Mid and Long Range

| Course | Shots | Distance | Record Time |
|-------------------------------------|----------|-----------|------------------|
| Prone | 10 or 20 | 50 Yds. | 10 or 20 Minutes |
| Sitting, Kneeling and Standing . | 10 or 20 | 50 Yds. | 15 or 30 Minutes |
| Dewar Course . . | 20 | 50 Yds. | 20 Minutes |
| | 20 | 100 Yds. | 20 Minutes |
| 50 Yard—Prone . | 40 | 50 Yds. | 40 Minutes |
| 50 Meters—Prone | 40 | 50 Meters | 40 Minutes |
| 100 Yards—Prone | 40 | 100 Yds. | 40 Minutes |
| 200 Yards—Prone | 20 | 200 Yds. | 20 Minutes |

Conventional Gallery

| | | | |
|--------------------|----------|--------------|------------------|
| Prone | 10 or 20 | 50 or 75 Ft. | 10 or 20 Minutes |
| Sitting | 10 or 20 | 50 or 75 Ft. | 10 or 20 Minutes |
| Kneeling | 10 or 20 | 50 or 75 Ft. | 10 or 20 Minutes |
| Standing | 10 or 20 | 50 or 75 Ft. | 10 or 20 Minutes |

NRA Three Position Course

| | | | |
|-------------|--------------|-------------------------|----------------------|
| Prone . . . | 10, 20 or 30 | 50 Ft. | 10, 20 or 30 Minutes |
| Prone . . . | 10, 20 or 30 | 50 Yds. or 50 Meters | 10, 20 or 30 Minutes |
| Kneeling . | 10, 20 or 30 | 50 Ft. | 15, 30 or 45 Minutes |

| | | |
|-------------------------|-------------------------|----------------------|
| Kneeling . 10, 20 or 30 | 50 Yds. or 50 Meters | 15, 30 or 45 Minutes |
| Standing . 10, 20 or 30 | 50 Ft. | 15, 30 or 45 Minutes |
| Standing . 10, 20 or 30 | 50 Yds. or 50 Meters | 15, 30 or 45 Minutes |

17. NATIONAL RECORDS

● **17.1 Where Scores for National Records Can Be Fired**—Scores to be recognized as National Records must be fired in NRA Competition as defined in Rule 21.1, paragraphs (c), (d), (e), and (f). National Records must be approved by the NRA before being declared official. National Records may not be established during re-entry matches.

17.2 Scores to be Used—Scores must be complete for an entire scheduled match (except in matches fired under ISU rules). Stage scores or scores for only part of a match will not be used for records. Scores fired over 50 feet or 75 feet will be considered for the establishment of National Records, whichever is higher. Mid-range or long range scores must be fired outdoors and not under artificial light.

17.3 Scores for National Individual Records—Such scores must be fired in individual matches. No score fired in a team match will be considered for recognition as an individual record. For recognition as special group records, "Open," "Civilian," "Regular Service," "Reserve components including National Guard," "Women" and "Juniors." Scores may be fired in either open or restricted matches. National Records will be recognized only when the competitor has entered such match.

● **17.4 Scores for National Team Records**—Such scores must be fired in matches where teams fire as a unit and no combination of individual match scores will be considered for recognition as a team record (except in The NRA Three Position Course). For recognition as special group records ("Open," "Civilian," "Regular Service," "Reserve components including National Guard," National Records will be recognized only when the competitor has "Women," and "Junior" categories) all members of the team must be members of the special group concerned (Rule 1.3). National Records will be recognized only when the competitor has entered such match. Teams must be bona fide teams as outlined in Rules 2.11 to 2.19. National Records will be recognized for "pickup" teams (teams made up of shooters who do not represent one of the groups outlined in Rule 2.11 to 2.19) when a tournament program specifically authorizes entry of this type team.

● 17.5 Courses of Fire for Which National Records Are Recognized—

NOTE: *National Smallbore Rifle Records are maintained for scores fired with Metallic and with Any Sights over the following courses for "Open," "Civilian," "Regular Service," "Reserve components including National Guard," "Women," and "Junior" categories.*

Outdoor Courses

Individual:

1. Dewar Course, 20 shots 50 yards, 20 shots 100 yards (A-23 and A-25 target)
2. 40 shots at 50 yards (A-23 target)
3. 40 shots at 100 yards (A-25 target)
4. 40 shots at 50 meters or 40 shots at 50 yards on the reduced 50 meter target (A-26 or A-27 target)
5. Aggregate of the above four matches
6. Aggregate of combined metallic and any sight aggregates of the above four matches
7. Aggregate of twice over the above four matches
8. The aggregate of 6400 points comprised of four times over the 40 shot, 50 yard, 50 meter, 100 yard and Dewar courses, twice over these courses with metallic sights and twice over the same courses with any sight
9. 40 shots at 50 yards, prone, sitting, kneeling and standing (10 shots in each position) (A-23 target)
10. 80 shots at 50 yards, prone, sitting, kneeling and standing (20 shots in each position) (A-23 target)
11. An aggregate of twice over the 80-shot 4-position match (12)
12. 20 shots sitting at 50 yards (A-23 target)
13. 20 shots kneeling at 50 yards (A-23 target)
14. 20 shots standing at 50 yards (A-23 target)
15. Grand aggregate of 1600 points which is a combination of the 800 point position iron sight aggregate and the 800 point position any sight aggregate
16. Grand aggregate of 3200 points which is a combination of the 1600 point position iron sight aggregate and the 1600 point position any sight aggregate.

Outdoor Team Courses

Two and Four-man Teams:

17. Dewar Course (20 shots 50 yards, 20 shots 100 yards)

18. 40 shots at 100 yards
19. 40 shots at 50 meters or 40 shots at 50 yards on the reduced 50 meter target
20. 40 shots at 50 yards, prone, sitting, kneeling and standing (10 shots in each position)
21. 80 shots at 50 yards, prone, sitting, kneeling and standing (20 shots in each position)

Indoor Courses

- 50 or 75 feet—Individual (A-17 or A-8 target)
22. 20 shots kneeling
 23. 20 shots sitting
 24. 20 shots standing
 25. 40 shots prone, sitting, kneeling and standing (10 shots each)
 26. 30 shots prone, kneeling and standing (10 shots each)
 27. The Open Sectional Aggregate Course
 28. Grand aggregate of 1600 points which is a combination of the 800 point iron sight aggregate and the 800 point position any sight aggregate.

NRA Three Position Courses

The following records apply to NRA Three Position Course matches with the exception that no prone records will be maintained indoors. Indoor records will be on the A-36 target. Outdoor records on the A-20, A-39 or A-49 targets. Each target must be fired at its stated distance.

Individual:

29. 40 shots prone
30. 60 shots prone
31. 20 shots kneeling
32. 40 shots kneeling
33. 20 shots standing
34. 40 shots standing
35. 60 shots prone, kneeling and standing (20 shots each)
36. 120 shots, may be fired as a single match, an aggregate of matches 29, 32, 34 or an aggregate of two times match 35
37. 240 shot aggregate (120 shots iron sight, and 120 shots any sights, each may be composed as in match 36)

Two Man and Four Man Teams—The following course to be fired by each member:

38. 30 shots prone, kneeling and standing (10 shots each)

39. 60 shots prone, kneeling and standing (20 shots each)
40. 120 shots prone, kneeling and standing (40 shots each).

NOTE: 50 meter matches may be fired indoors on A-20, A-49 or A-39 targets. (For record purposes scores will be considered with those fired on A-36 targets.)

Indoor Team Courses

Two and Four-man Teams—The following courses to be fired by each member:

41. 40 shots prone, sitting, kneeling and standing (10 shots each)
42. 30 shots prone, kneeling, and standing (10 shots each)
43. 40 shots prone and standing (20 shots each).

19. NATIONAL SMALLBORE RIFLE CLASSIFICATION

General

19.1 Classified Competitors—Are all individuals who are officially classified by the NRA for smallbore competition, or who have a record of scores fired over the courses of fire used for classification (See Rule 19.4) which have been recorded in a Score Record Book.

19.2 Unclassified Competitor—A competitor who has not fired in NRA Smallbore rifle competition during the previous three successive calendar years or who has not been classified as a Master. Such unclassified competitor shall fire through his first tournament (or first tournament following the loss of his classification—Rule 19.9) in the Master Class.

19.3 (Blank)

• **19.4 Matches Used for Individual Classification**—Scores to be used for classification and reclassification will be those fired in matches in NRA Competition as defined in Rule 21.1 (except Postal Matches) over the following courses of fire and under the indicated conditions:

Outdoor Prone Classification:

- Dewar course (50 and 100 yard)
- 50 Yards
- 50 Meters, on regular or reduced target
- 100 Yards

NRA Three Position Course Classification:

(prone, kneeling, and standing. Indoor-Outdoor) 50 feet A-36 target, 50 yards A-39 target, 50 meters A-20, and A-49 target.

Outdoor Position Classification:

50 yard, 50 meter or 100 yard matches fired in any of the following positions: prone, sitting, kneeling and standing.

Indoor Classification:

50 or 75 foot matches fired in any of the following positions, prone, sitting, kneeling and standing.

Both metallic and "any" sight match scores will be used. Matches may be fired outdoors or indoors. Scores fired indoors over outdoor courses will not be used for outdoor classification. Scores from Registered Leagues may be used during the league firing season in Score Record Books (19.14) but will only be used by NRA Headquarters at the end of the league firing season for issue of Official Classification Cards.

• 19.5 Compilation of Scores for Classification Averages—

Scores fired in complete matches over the above Outdoor Prone Courses will be combined for the "Outdoor Prone Classification." Scores fired in complete matches over the above Outdoor Position Courses will be combined for the "Outdoor Position Classification" and scores fired in complete matches over the above Indoor Courses will be combined for the "Indoor Classification." Scores fired in complete matches over the above Three Position courses will be combined for the NRA Three Position Course classification.

• 19.6 Assigned Classification—A competitor who has an earned classification (a classification obtained through his Score Record Book or an Official NRA Classification Card) for one type of competition in the grouping listed below will be assigned this same classification in any other type in which he is not classified in the same group. If he has a classification in more than one type in the list below, he shall use the higher classification. After his first tournament in the new type, he will use his Score Record Book rather than his assigned classification when entering his second tournament in the new type.

Smallbore and High Power Rifle:

- | | |
|-------------------------------|-------------------------|
| (a) Indoor Position | (d) Outdoor Prone |
| (b) Outdoor Position | (e) International Rifle |
| (c) NRA Three Position Course | (f) High Power Rifle |

19.7 Lack of Classification Evidence—It is the competitor's responsibility to have his NRA Official Classification Card or Score Record Book with required scores for temporary classification (see Rules 19.1 and 19.14) and to present such classification evidence when required. Any competitor who cannot present such evidence will fire in the Master Class. A competitor's classification will not change during a tournament. A competitor will enter a tournament under his correct classification and fire the entire tournament in that class. Should it be discovered during a tournament that a competitor has entered in a classification lower than his current rating, the tournament records will be corrected to show the correct classification for the entire tournament.

19.8 Competing in a Higher Class—Any individual or team may elect, before firing, to compete in a higher classification than the one in which classified. Such individual or team must fire in such higher class throughout that tournament and not revert to earned classification for any event in that tournament.

When there are insufficient entries in any class to warrant an award in that class according to the match program conditions, the individual or team concerned may be moved by the Tournament Executive Officer to a higher class provided this change is made prior to the individual or team concerned having commenced firing in the tournament.

19.9 Obsolete Classifications and Scores—All classifications and scores (including temporary, Rule 19.14) except Master, shall become obsolete if the competitor does not fire in NRA competition at least once during three successive calendar years. Master classifications and scores shall become obsolete if the competitor does not fire in NRA competition at least once during five successive calendar years. Lifetime Master classifications will not become obsolete.

19.12 Team Classification—Teams are classified by computing the "team average" based on the classification of each firing member of the team. To compute this "team average" the key in Table No. I for the different classes will be used for both outdoor and indoor competition and the team total divided by the number of firing members of the team. Any fractional figure in the team average of one half or more places team in next higher class. The "team average" will establish classification of the team as a unit but will not affect in any way the individual classification of team members.

Table No. I
Outdoor and Indoor

| <i>Class</i> | <i>Key</i> | <i>Class</i> | <i>Key</i> |
|--------------|------------|--------------------|------------|
| Master | 4 | Sharpshooter | 2 |
| Expert | 3 | Marksman | 1 |

● **19.15 Establishing Classifications**—Classification or reclassification averages will be based on average scores reported for ten shot strings, computed only after the total scores for tournaments, or a league season have been posted and, therefore, the average may be based on a number of shots greater than the required minimum number as specified. When the scores for the required minimum number of shots (or more if the minimum is reached during a tournament, or league season) have been posted, the average score per 10 shot string will be computed. The competitor will then be sent an official NRA classification card based on the average so computed and according to the tables for the specific type of competition concerned. This classification will become effective the date shown on the card issued by NRA. The classification averages and minimum number of shots required are as follows:

- (a) Outdoor Prone—200 shots minimum required for classification.

| | |
|--------------------|-----------------|
| Master | 99.50 and above |
| Expert | 98.50 to 99.49 |
| Sharpshooter | 97.50 to 98.49 |
| Marksman | Below 97.50 |

- (b) Conventional Position—160 shots minimum required for classification.

Outdoor

| | |
|--------------------|-----------------|
| Master | 93.00 and above |
| Expert | 89.00 to 92.99 |
| Sharpshooter | 85.00 to 88.99 |
| Marksman | Below 85.00 |

Indoor

| | |
|--------------------|-----------------|
| Master | 97.50 and above |
| Expert | 95.00 to 97.49 |
| Sharpshooter | 90.00 to 94.99 |
| Marksman | Below 89.99 |

- (c) NRA Three Position Course—120 shots minimum required for classification.

| | |
|--------------------|-----------------|
| Master | 95.00 and above |
| Expert | 92.00 to 94.99 |
| Sharpshooter | 88.00 to 91.99 |
| Marksman | Below 88.00 |

• 19.16 Reclassification

- (a) A competitor who has been classified by the NRA will be reclassified upward when his average, as computed below, places him in a higher class. The scores used for reclassification will be his recorded NRA competition scores as maintained at NRA Headquarters, not previously used for classification purposes. The average will be computed when the scores for the minimum number of shots for reclassification (or more if the minimum is reached during the scores of any tournament or league) have been posted. The reclassified competitor shall be sent a new classification card which will become effective the date indicated on the card issued by the NRA.
- (b) Minimum posted shots required for upward classification:
- (1) Outdoor Prone

| Reclassified to | Minimum Shot Required |
|--------------------|-----------------------|
| Sharpshooter | 400 |
| Expert | 400 |
| Master | 700 |

 (See Table in Rule 19.15 for percentages)
 - (2) Outdoor and Indoor Position

| Reclassified to | Minimum Shot Required |
|--------------------|-----------------------|
| Sharpshooter | 160 |
| Expert | 320 |
| Master | 320 |

 (See Table in Rule 19.15 for percentages)
 - (3) NRA Three Position Course

| Reclassified to | Minimum Shot Required |
|--------------------|-----------------------|
| Sharpshooter | 120 |
| Expert | 240 |
| Master | 360 |

 (See Table in Rule 19.15 for percentages)
- (c) A competitor who believes his classification is too high (except that a Lifetime Master will not be reclassified, see 19.21) may file a request with the NRA Activities Division that his classification be lowered. Such competitor must remain in the class concerned until at least the following have been posted to his record after receipt of the request:
- | | |
|---------------------------|-------------------|
| Prone Reclassification | 1200 Record Shots |
| Outdoor and Indoor Pos. | 960 Record Shots |
| NRA Three Position Course | 960 Record Shots |
- When the average of such shots places the competitor in a lower class he will be reclassified accordingly.

- (d) If a competitor thus reclassified downward, and thereafter, by scores fired in NRA competition (except NRA Postal Matches), again earns a higher classification, he shall not again be reclassified downward.

19.21 Lifetime Master—An individual in a Master class may upon application to the NRA be certified as a Lifetime Master and will be issued a special card so indicating. A competitor may be a Lifetime Master for one type of competition and in a lower for other types. The election herein provided for, once made, shall be irrevocable.

21. NRA COMPETITIONS

21.1 Types—NRA competitions will be classified as follows:

- (a) *International Matches*—Arranged by the NRA with the recognized national shooting organization(s) of the countries concerned. The officials thereof are appointed by the NRA.
- (b) *International Team Tryouts*—Are U.S. tournaments conducted under ISU rules (or the NRA International Rule Book) organized or authorized by the NRA as Preliminary for Final Tryouts for the selection of International team members. The officials thereof to be appointed or approved by the NRA.
- (c) *National Championships*—Organized by the NRA and, in some cases, by the National Board for the Promotion of Rifle Practice, Department of the Army, in cooperation with the NRA. The officials thereof are appointed by the NRA, in certain cases in conjunction with the National Board.
- (d) *Regional and Sectional Championships*—Arranged between the NRA and a local sponsoring organization.
- (e) *State Championships*—Annual tournaments conducted by State Rifle and/or Pistol Associations affiliated with the NRA. Such state associations may, if desired, authorize local organizations to sponsor and conduct State Championships. In states where there is no NRA affiliated State Association the NRA may authorize a local organization to sponsor and conduct the State Championship.
- (f) *Registered Tournaments*—May be authorized by the NRA after application has been filed by the local NRA affiliated member organization which will act as the sponsor. Application forms and printed General Regulations available from NRA on request.

- (g) *Approved Tournaments*—May be authorized by the NRA after application has been filed by the local NRA affiliated member organization which will act as the sponsor. Application forms and printed General Regulations available from NRA on request.
- (h) *Registered Leagues*—May be authorized by the NRA after application has been filed by the local NRA affiliated member organization or group of such organizations. Application forms and General Regulations are mailed to all NRA affiliated organization members prior to both Summer and Winter League seasons. Application forms and General Regulations also available from NRA on request. Registered league scores are used for classification.
- (i) *Postal Matches*—Organized by the NRA and publicized to groups concerned through THE AMERICAN RIFLEMAN and TOURNAMENT NEWS announcements and special mailings.

Tips on Smallbore Rifle Target Shooting

Frederick E. Triggs, Chatham, N. J.

Sling should be high or low on the shoulder. Pulse will be bad if in the middle. I like it as low as possible, as it is always in the same spot. If you shoot without taking down the stock, it will stay there.

Several sweatshirts under the shooting coat helps pulse. An extra left sleeve helps. The coat should be very tight, the elastics across the back very tight. Uncomfortable, but you should be locked up like a vise.

A 45 percent scope is very easy to use. When buying any scope it's a good idea to try it in bad light conditions. There is a big difference in scopes of the same manufacturer.

A stock too long is hard to shoot well. Many now

shoot without taking the gun from the shoulder. It sure is faster.

Faster is better. Less changes to shoot through and more shots in the same condition. But keep watching.

Paddle tennis rubber does not slip much on your coat. Real rubber is the best; USA synthetic is NG. Use on shooting coats and where needed.

Advanced Marksmanship Units use plenty of sweatshirts under a leather coat. But some heavy USA coats are no longer legal in matches out of the USA.

Thumb should go back around the stock, so you pull against this thumb. Hold right on to it, but the trigger must be on a joint in the finger. The joint does not give, and you can pull a heavy trigger this way if you are holding well.

Nylon buttons on a target scope are NG. Bench rest shooters will not use them. They load up.

The prone position with the right knee up was probably first used in the NYC Metropolitan. It is a very straight position and can be used close to the tunnel walls. This is a very good position, used long before the Advanced Marksmanship Unit existed. This match was about 50 years old when closed out in 1974.

Slings should be changed between 50 and 100 yards. Holes should be punched between the holes already in slings. They are too far apart.

Ports should be changed after every match by the people running them. Camp Perry is so big the

wind is about the same along the line, but some ports are better than others and you can draw a bad one. You do not win the Sawgrass match in Miami from the middle of the range. You do not win in Auburn, N.Y. on the left-hand ports, but they are smart enough to rotate the shooters.

Scoring changes from side to side in some matches, such as the Canadian Nationals. 10's in one tent are 9's in another. So be lucky and draw the best scoring. Write down the score you expect and check it back before time runs out. All scorers make mistakes. Check them.

Close shots through the scope are usually in at 50 yards, out at 100 yards and never in at 200 yards. Close shots at the top of the bull are mostly in, at the bottom seldom. The best conditions and the winners at 200 yards are early in the morning. Too bad there are no more 200-yard matches, that I can find. A good gun was good, too.

Winning ammo does not grow on bushes. Red Eley is the winner now, but some batches are a lot better than others. When you get that good lot, save it to check back on. When you get a great lot, save it for the big matches. And keep trying.

Best lot I ever had was Black Eley. Black is Red Eley that does not test quite as well in the Test Anshutz guns. But it might go well for you. USA ammo is not at its best these last few years, and they have cut down on their promotion men and efforts.

Use laminated wood for custom stocks; it warps less. Glass the stocks, and waterproof the wood in-

side. Sometimes they could get wet. One gun, a prize for winning at Perry, grouped 6" after being wet there. Standard guns should be waterproofed, too.

The match rifle that wins could be an Anschutz, Hart Barrel, Kenyon trigger, Swem Bedder. One gun can go sour; you need a back-up gun.

If you are over forty, additional length between front and rear iron sights sharpens the image, such as a Womack front sight.

A sight correction should be in a 1½" holder. It's easier to clean, cheaper to grind.

Color filters can be ahead of the correction. Yellow is right 90 percent of the time. Blue is good if there is too much light or reflections.

Correction should be distance correction plus ¼ diopter. If you push this forward 2", it adds ¼ diopter.

If the sight is forward, it centers the rear aperture.

The rear sight should not touch anything solid. It can touch the eyebrows. It should always be exactly the same. The rear sight will move.

Shooting glasses or lenses take on grease from the eyebrows. This can best be cleaned with cold water; it just rolls up the grease. Hot will not do this.

The rear aperture should be smaller when the light is bright, bigger in less light. The front aperture should be about 140/1000. If you are younger, it can be smaller. There should be quite a bit of white around the bull. When you have the right size, stay with it. It helps when shading the bull.

If a gun does not shoot well:

If there is a big error, check the sights first.

Then recrown the barrel. This fixes most barrels. Winchester has come from no crown to a $\frac{3}{8}$ -inch recrown on new match guns.

Last rechamber. Then if NG, rebarrel.

I believe that lead bullets no longer have much tin (it's 1.50 per pound), so you have to clean often. Stainless barrels such as Hart must be cleaned every match or oftener. The stainless gaugs and will pick up lead.

Stainless is used as it is more inert and does not give big vibrations.

Use a Ken Kleinendorst rifle cleaning cable if you have to clean from the front. He is the best match gunsmith in this area.

A Winchester .52 needs a front end bedder to shoot well. A Remington .40X, being stiffer, can shoot free floating.

Cover your gun between matches. The sun will heat it up and completely destroy accuracy.

$\frac{1}{4}$ minute clicks on sights are better. You can remember how many clicks windage you have on. On some sights you can add half a click, and this is easier for me to remember. On a switch you know how many clicks bring you back to center, and you can add on from there.

Four barrels wore out in the same year. Checking from gun to gun of course showed nothing. Trouble. Cleaning from the front brought this on.

There is no good book on this target shooting. Crossman's was the best, but it's very old.

Prone is the big field. Position is entirely different and smaller.

Ammo selecting is hard and continues. Some ammo shoots well in one gun and badly in others. It's like working up a load in big bore. Right now all the winners use Red Eley Ammo and usually Anschutz guns.

A good smallbore man can easily switch to big bore. I have never known a big-bore man to be good at smallbore. Smallbore holds better and has the wind more.

High-Power Rifle Matches

The following are excerpts from the National Rifle Association High Power Rifle Rules.* For additional information and complete rules write to the NRA.

1. TYPES OF COMPETITION

1.1 High Power Rifle Match—Any match fired with centerfire rifles. A match may consist of one or more stages.

1.2 Open Match—A match open to anyone. An open match may be limited to citizens of the United States or to members of the National Rifle Association of America. Such limitation must be stated in the program.

1.2.1 National Trophy Matches—The National Trophy Matches are organized and conducted under the direction of the National Board for the Promotion of Rifle Practice (NBPRP).

These matches are conducted in accordance with rules and regulations contained in the Army Regulations 920-30; OPNAVINST 3590.7B; AFR 50-17; MCO P3590.13, entitled "Rules and Regulations for National Matches" dated June 1967.

* Grateful acknowledgment is made to the NRA for permission to publish these excerpts.

1.2.2 National Matches—The National Matches are the combined NRA National Championships and the National Trophy Matches.

1.3 Restricted Match—A match in which competition is limited to specified groups, i.e., juniors, women, police, civilians, veterans, etc.; or to specified classes, i.e., Distinguished Riflemen, Masters, Experts, Sharpshooters, Marksmen, etc.

1.4 Classified Match—A match in which prizes are awarded to the winners and to the highest competitors in several specified classes such as Masters, Experts, Sharpshooters, Marksmen. The classification of competitors may be accomplished by the National Classification System (Sec. 19) or by other means. The program for classified matches must specify the groups or classes in which awards will be made.

1.5 Invitational Match—A match in which participation is limited to those who have been invited to compete.

1.6 NRA Competition—Competition sanctioned in advance of firing by the National Rifle Association. The program, range facilities and officials must comply with standards established by the NRA. (See Section 21)

1.7 League Competition—A form of competition in which teams compete one against another under a pre-arranged schedule in a series of matches. Leagues usually provide for each team to fire against each other team at least once during the league season. Final standings are usually determined by the percentage of matches won by those who fired the required number of matches. Special prizes may be awarded for high individual or team score.

1.8 Squadded Individual Match—A match in which each competitor is assigned a definite relay and target by the statistical office. Failure to report on the proper relay or firing point forfeits the right to fire. All entries must be made before firing commences in that match, except when otherwise stated in the tournament program (Rule 9.20).

1.9 Unsquadded Individual Match—A match in which the competitor is not assigned a definite relay or target by the statistical office. The competitor reports to the range officer within the time limits specified in the program and is then assigned to a target and a relay in which to fire.

1.10 Re-Entry Match—A match in which the competitor is permitted to fire more than one score for record; one or more of the highest scores being considered to determine the relative rank of competitors. The number of scores which

may be fired, and the number of high scores to be considered in deciding the relative rank of competitors must be specified in the program.

• **1.11 Squadded Team Match**—A match in which the teams are assigned a definite time to fire. Teams may be assigned one or more adjacent targets. All entries must be made before firing commences in that match. The entire team must report and fire as a unit.

1.12 Unsquadded Team Match—A match in which the teams may report at the firing line at any time within the limits specified in the program, targets being assigned by the Range Officer. The entire team must report and fire as a unit, unless the program provides otherwise.

1.13 Aggregate Match—An aggregate of the scores from two or more matches. This may be an aggregate of match stages, individual matches, team matches, or both, provided the tournament program clearly states the matches which will comprise the aggregate. Entries in aggregate matches must be made before the competitor commences firing in any of the matches making up the aggregate match.

1.13.1 Tournament—A tournament is a series of matches covered by an official program. Such matches may be all individual matches, all team matches or a combination of both; they may be all fired matches or a combination of fired and aggregate matches. A tournament may be conducted on one day, or successive days or may provide for intervening days between portions of the tournament, such as tournaments programmed for conduct over more than one weekend.

2. ELIGIBILITY OF COMPETITORS

Eligibility of Competitors—The conditions of a match shall prescribe the eligibility of competitors, team or individuals, in accordance with Rules 1.2, 1.3, 1.4, 1.5 and/or the definition contained in Section 2. Any limitations of eligibility to compete must be stated in the Match Program.

Individuals

2.1 Members of the National Rifle Association—Any individual member in good standing, including Benefactors, Patrons, Endowment, Life, Annual, Associate, Non-Resident and Junior members.

2.2 Civilian—Any civilian including all members of the Reserve Officers Training Corps (ROTC, NROTC and AFROTC), personnel of the State Security Forces (e.g., State Guard organizations having no federal recognition),

retired members of each of the several services comprising the Armed Forces of the United States, and members and former members entitled to receive pay, retirement pay, retainer pay or equivalent pay, are classified as civilians except as noted in the example below. All competitors who are enrolled undergraduates of any of the service academies will be considered as civilians, and may compete in collegiate and ROTC categories.

Individuals of any Reserve or National Guard component who, *during the present calendar year*, have not competed as National Guard (2.5) or Regular Service (2.6) or Reserve component (2.7) *and* have not been provided Service support for competition (in the form of weapons, ammunition, payment of travel or other expenses), wholly or in part, may fire as civilians. The provision of weapons and ammunition for a specific competition (i.e., National Matches or NBPRP Regional Leg Matches), when such is available to both military and civilian competitors, is not considered Service support under this rule.

Unless specifically authorized to do so by the tournament program, members of the regular Army, Navy, Air Force, Marine Corps, Coast Guard; members of the reserve components on active duty; retired personnel of the several services comprising the Armed Forces of the United States on active duty; or police (rule 2.4) are not permitted to compete as civilians.

2.3 Junior—Any boy or girl who has not reached his or her nineteenth (19th) birthday who is either an individual NRA member or a member of an NRA affiliated club. A junior's age at the start of a tournament, league or match series will govern his eligibility.

Example: A Junior whose 19th birthday will be June 19th enters a tournament, the matches of which will be fired on June 18, 19 and 20. Because he is a junior at the start of this tournament he is eligible to continue the tournament on June 19 and 20.

2.4 Police—Any regular, full time member of a regularly constituted law-enforcement agency, including the enforcement officers of the several departments of the United States Government; State, County or Municipal Police Departments; Highway Patrols; Penal Institution Guards; full time salaried Game Wardens, Deputy Game Wardens and Deputy Sheriffs; regularly organized Railroad or Industrial Police Departments, Bank Guards and Armored Truck and Express Company Guards.

Special Officers, Honorary Officers, Civilian Instructors, Deputy Sheriffs, Deputy Game Wardens or Police Officers

who are not on a full time, full pay basis in a single department are not eligible to compete as police.

2.5 National Guard—Federally recognized officers or enlisted men of the Army National Guard, the Air National Guard, or the Naval Militia of the several states, territories, the District of Columbia, or the Commonwealth of Puerto Rico, who are not on extended active duty.

2.6 Regular Service—Officers or enlisted men of the Regular United States Army, Navy, Air Force, Marine Corps, Coast Guard, and members of reserve components thereof, who are on extended active duty; provided the term "Reserve Components" shall include Army National Guard and Air National Guard called into federal service and while in such status.

2.7 Reserve Components—Officers and enlisted men of any reserve component of the Armed Forces, exclusive of the Army National Guard and the Air National Guard of the United States, not on extended active duty.

2.8 College—Regularly enrolled undergraduate students who comply with the eligibility rules of their institution. An undergraduate is a student who has not received his bachelors degree.

Unless specifically authorized to do so by the tournament program, members of the regular Army, Navy, Air Force, Marine Corps, Coast Guard; members of the reserve components on active duty; retired personnel of the several services comprising the Armed Forces of the United States on active duty; or police (Rule 2.4) are not permitted to compete as collegiate.

2.9 School—Regularly enrolled undergraduate students of any primary or secondary school, who comply with the eligibility rules of their institutions.

Teams

2.10 Team Representation—No competitor may fire on more than one team in any one match.

2.11 Affiliated Club Teams—Members of such teams must (a) have been active, fully paid members of the club for a period of at least 10 days immediately prior to the date of the competition; (b) the club must be affiliated with the NRA and in good standing.

2.12 State Association Teams—Members of such teams must be individual members of the State Rifle and/or Pistol Association represented if such State Association provides for individual membership, or be members of a rifle and/or

pistol club which is affiliated and in good standing with the State Association concerned at the time of the competition. State Association teams permitted to enter the competition concerned by the tournament program conditions, must be authorized and accredited by the State Association for that tournament. Authorization shall be signed by the State Association President, Vice President or Secretary. Such State Associations must be affiliated and in good standing with the NRA at the time of the competition.

(EXPLANATORY NOTE: *Teams representing State Associations, Leagues and other associations (composed of more than one club) are not club teams. Such teams may enter NRA sanctioned matches only when the program specifically authorizes such entry.*)

2.13 Regular Service, National Guard or Other Armed Forces Reserve Teams—Members of such teams must have been commissioned or enlisted members of their respective service for a continuous period of at least thirty days immediately preceding the day of competition. Army National Guard, Air National Guard, and Naval Militia personnel may be combined into a single team.

2.14 Police Teams—Members of such teams must have been regular, full time members of their respective organization and in active service for a continuous period of at least thirty days immediately preceding the day of competition.

2.15 Civilian Club Teams—Members of such teams must comply with the requirements of Rule 2.11.

2.16 College Teams—Members of such teams must comply with the requirements of Rule 2.8.

2.17 School Teams—Members of such teams must comply with requirements of Rule 2.9.

2.18 Junior Club Teams—Members of such teams must be regularly enrolled members, who have not reached their 19th birthday, of a junior club, junior patrol or junior division of a senior club which is duly and properly affiliated and in good standing with NRA.

2.19 Fraternal and Veteran Organization Teams—Members of such teams must be active "paid-up" members of the Chapter or Post which the team represents.

2.20 Residence—In those matches which are limited to residents of any specified geographical area a "resident" is defined as:

- (a) A person who lives within a specified area for at least thirty days immediately prior to the day of the

match, whether or not his employment is at a place requiring him to commute or travel into some other area.

- (b) A person who has been regularly employed within specified area for at least thirty days immediately prior to the day of the match and who has maintained domicile in that area for the same period of time, although his permanent residence is located outside the specified area.
- (c) Military, Naval and Air Force Personnel: The place of residence of members of the Military, Naval and Air Force establishments on active duty is defined as the place at which they are stationed by reason of official orders, provided they have been so stationed within the specified area for a period of at least thirty days immediately prior to the day of the match. In the case of retired, Reserve, or National Guard personnel not on active duty, the provisions of paragraphs (a) and (b) will apply. Naval personnel assigned on sea duty qualify for a residence in the area which is the usual base or home port of the unit to which attached.
- (d) Federal and State Law Enforcement Officers: The provisions of paragraph (c) will apply.

3. EQUIPMENT AND AMMUNITION

It is the intent of this section to define authorized equipment. It is not the intention to restrict in any way the legal use of such equipment.

3.1 Service Rifle—U.S. Rifle, Caliber .30 M1 as issued by the U.S. Armed Forces, or modified with a 7.62 barrel, having not less than 4½ pound trigger pull, with standard type stock and standard type leather or web sling. Sling cuffs and sling pads are not permitted. External alterations to the stock will not be allowed. The application of synthetic coatings, which includes those containing powdered metal, to the interior of the stock to improve bedding is authorized provided the coating does not interfere with the function or operation of safety features. The front and rear sights must be United States Army design, but may vary in dimensions of rear sight aperture and front sight blade. The internal parts of the rifle may be specifically fitted and include alterations which will improve the functioning and accuracy of the arm, provided such alterations in no way interfere with the proper functioning of the safety devices as manufactured. Commanders concerned are responsible that rifles modified are inspected to

insure adequate safety. It is the competitor's responsibility to have his rifle checked prior to the firing of a match.

● **3.1.1 Service Rifle**—U.S. Rifle, Caliber 7.62 mm M14 as issued by the U.S. Armed Forces or the same type and caliber of commercially manufactured rifle, having not less than a 4½ pound trigger pull, with standard type stock and standard leather or webb sling. Sling cuffs and sling pads are not permitted. The rifle must be so adjusted as to be incapable of automatic fire without removing the stock and changing parts. In all courses and in all positions the 20-round box magazine will be attached. The hinged butt plate will be used only in the folded position. The gas system must be fully operational. External alterations to the stock will not be allowed. The application of synthetic coatings, which includes those containing powdered metal, to the interior of the stock to improve bedding is authorized provided the coating does not interfere with the function or operation of safety features. The front and rear sights must be of United States Army design, but may vary in dimensions of rear sight aperture and front sight blade. The internal parts of the rifle may be especially fitted and include alterations which will improve the functioning and accuracy of the arm, provided such alterations in no way interfere with the proper functioning of the safety devices as manufactured. It is the competitor's responsibility to have his rifle checked prior to the firing of a match.

● **3.3 NRA Match Rifle**—A center fire rifle with metallic sights, with not less than 3 pound trigger pull. The service rifle may be used unless otherwise specified in the program.

3.4 Any Rifle—A rifle with no restrictions on sights, ammunition or accessories, except that it must be safe to competitors and range personnel.

3.5 Sporting Rifle—A center fire rifle of any caliber, not equipped with palm rest or Schuetzen type butt plate, with not less than 3 pound trigger pull, weighing not over 9 pounds, excluding a sling and including sights.

● **3.7 Sights**

(a) *Metallic*—

(1) Non-corrective:

Any sighting system, constructed of metal or equivalent, which provides a method of aiming or aligning two separate but visible sights, or reference points, mounted on the rifle, including tube sights and non-magnifying color filters.

(2) Corrective:

Same as (1), except that a lens or system of lenses,

not containing an aiming reference or reticle at the focal plane of any such lens or system of lenses, may be included in such system.

- (b) *Telescopic*—Any sighting system which includes a lens or system of lenses and an aiming reference or reticle at the focal plane of a lens or system of lenses.
- (c) *Any*—Any sight without restriction as to material or construction.
- (d) *Service*—The regulation metallic sights as currently prescribed for the M1 and M14 rifles by the using Service, without modification or addition.
- (e) *Any Military*—The regulation metallic sights as prescribed for the particular rifle in question without modification or additions.

3.17 Ammunition—

- (a) *Service*—Ammunition manufactured for or by the Government and issued by the United States Army for use in service arms. The use of armor-piercing ammunition may be prohibited by local range or match regulations. Use of tracer or incendiary ammunition is prohibited.
- (b) *Any*—Ammunition of any description that may be fired without danger to competitors or range personnel. Tracer or incendiary ammunition is prohibited. The use of armor-piercing or any other type ammunition may be prohibited by local range or match regulations.

4. TARGETS

4.1 Official Targets—In Registered and Approved Rifle Matches, only targets bearing the words, "Official National Rifle Association" and the eagle and shield insignia of the Association, or military targets issued by the Armed Services, will be used. (Except Military A and B targets, see Rule 4.7.)

NOTE: The new military targets for 200 and 300 yards are known as "Target, Rifle, Competition, Short Range" and the target for 500 and 600 yards is known as "Target, Rifle, Competition, Mid-Range." These definitions are abbreviated as "S-R" and "M-R" respectively in the descriptions which follow for the reduced targets. Military targets S-R, M-R, A, B, and C should all be ordered from the Director of Civilian Marksmanship.

Official Target Dimensions

All high power targets have single bullseyes.

4.2 100-Yard Targets

a. N.R.A.—No. S-R-1—Reduction of the S-R Target for use at 100 yards to simulate the 200-yard stages of the National Match Course.

| <i>Aiming Black</i> | (inches) | <i>Rings in White</i> | (inches) |
|---------------------|----------|-----------------------|----------|
| X ring..... | 1.35 | 8 ring..... | 9.35 |
| 10 ring..... | 3.35 | 7 ring..... | 12.35 |
| 9 ring..... | 6.35 | 6 ring..... | 15.35 |
| | | 5 ring..... | 18.35 |

b. N.R.A.—No. S-R-2—Reduction of the S-R Target for use at 100 yards to simulate the 300-yard stage of the National Match Course.

| <i>Aiming Black</i> | (inches) | <i>Rings in White</i> | (inches) |
|---------------------|----------|-----------------------|----------|
| X ring..... | .79 | 8 ring..... | 6.12 |
| 10 ring..... | 2.12 | 7 ring..... | 8.12 |
| 9 ring..... | 4.12 | 6 ring..... | 10.12 |
| | | 5 ring..... | 12.12 |

c. N.R.A.—No. M-R-3—Reduction of the M-R Target for use at 100 yards to simulate the 600-yard stage of the National Match Course.

| <i>Aiming Black</i> | (inches) | <i>Rings in White</i> | (inches) |
|---------------------|----------|-----------------------|----------|
| X ring..... | .75 | 7 ring..... | 5.75 |
| 10 ring..... | 1.75 | 6 ring..... | 7.75 |
| 9 ring..... | 2.75 | 5 ring..... | 9.75 |
| 8 ring..... | 3.75 | | |

● 4.3 200-Yard Targets

a. N.R.A.—No. S-R-4—Reduction of the S-R target for use at 200 yards to simulate the 300-yard stage of the National Match Course.

| <i>Aiming Black</i> | (inches) | <i>Rings in White</i> | (inches) |
|---------------------|----------|-----------------------|----------|
| X ring..... | 1.90 | 8 ring..... | 12.56 |
| 10 ring..... | 4.56 | 7 ring..... | 16.56 |
| 9 ring..... | 8.56 | 6 ring..... | 20.56 |
| | | 5 ring..... | 24.56 |

b. N.R.A.—No. M-R-5—Reduction of the M-R target for use at 200 yards to simulate the 600-yard stage of National Match Course.

| <i>Aiming Black</i> | (inches) | <i>Rings in White</i> | (inches) |
|---------------------|----------|-----------------------|----------|
| X ring..... | 1.79 | 7 ring..... | 11.79 |
| 10 ring..... | 3.79 | 6 ring..... | 15.79 |
| 9 ring..... | 5.79 | 5 ring..... | 19.79 |
| 8 ring..... | 7.79 | | |

c. No. S-R—Military “Target, Rifle, Competition, Short Range.” Used in 200- and 300-yard stages of the National Match Course.

| <i>Aiming Black</i> | (inches) | <i>Rings in White</i> | (inches) |
|---------------------|----------|-----------------------|----------|
| X ring..... | 3.00 | 8 ring..... | 19.00 |
| 10 ring..... | 7.00 | 7 ring..... | 25.00 |
| 9 ring..... | 13.00 | 6 ring..... | 31.00 |
| | | 5 ring..... | 37.00 |

d. N.R.A.—No. S-R-5—Same scoring ring dimensions as No. S-R—Military; with scoring rings through 7, only; paper size 28 x 28 inches for use at 200 yards on ranges with small target frames.

● 4.4 300-Yard Targets

a. No. S-R—Same as for 200 yards.

b. N.R.A.—No. M-R-6—Reduction of the M-R target for use at 300 yards to simulate the 600-yard stage of National Match Course.

| <i>Aiming Black</i> | (inches) | <i>Rings in White</i> | (inches) |
|---------------------|----------|-----------------------|----------|
| X ring..... | 2.85 | 7 ring..... | 17.85 |
| 10 ring..... | 5.85 | 6 ring..... | 23.85 |
| 9 ring..... | 8.85 | 5 ring..... | 29.85 |
| 8 ring..... | 11.85 | | |

4.6 600-Yard Targets

a. No. M-R—Target, Rifle, Competition Mid-Range. Used in 600-yard stage of National Match Course and in 500-yard matches.

| <i>Aiming Black</i> | (inches) | <i>Rings in White</i> | (inches) |
|---------------------|----------|-----------------------|----------|
| X ring..... | 6.00 | 7 ring..... | 36.00 |
| 10 ring..... | 12.00 | 6 ring..... | 48.00 |
| 9 ring..... | 18.00 | 5 ring..... | 60.00 |
| 8 ring..... | 24.00 | | |

4.7 Official Military Targets

NOTE: Military A and B targets may *NOT* be used for NRA classification nor for establishing National Records.

a. Target A—200 and 300 yards

| <i>Aiming Black</i> | (inches) | <i>Rings in White</i> | (inches) |
|---------------------|----------|-----------------------|----------|
| V ring..... | 4 | 4 ring..... | 24 |
| 5 ring..... | 12 | 3 ring..... | 36 |

b. Target B—500 and 600 yards

| <i>Aiming Black</i> | (inches) | <i>Rings in White</i> | (inches) |
|---------------------|----------|-----------------------|----------|
| V ring..... | 12 | 4 ring..... | 40 |
| 5 ring..... | 20 | 3 ring..... | 60 |

c. Target C—1000 yards

| <i>Aiming Black</i> | (inches) | <i>Rings in White</i> | (inches) |
|---------------------|----------|-----------------------|----------|
| V ring..... | 20 | 4 ring..... | 54 |
| 5 ring..... | 36 | 3 area..... | 6x6 ft. |

5. POSITIONS

The same as for Smallbore Rifle Rules except Rule 5.11 does not apply to High-Power Rifle Rules.

7. COURSES OF FIRE

These courses may be fired using either the decimal, International or military type target. The courses shown are those most frequently found in NRA competition programs, but should not be considered the only courses which may be scheduled. Special courses may be developed by tournament sponsors and scheduled whenever desired, provided the conditions are clearly stated in the program.

These courses may be fired with either metallic or "any" (includes telescopes) sights. Separate matches should be scheduled for each type of sights.

The following courses and types of fire are commonly found in competition. See Rule 8.2 for time limits.

| Course | Shots | Distance | Type of Fire |
|--------------------------|----------|-----------|----------------------|
| Prone | 10 or 20 | 100 yards | slow |
| Sitting | 10 or 20 | 100 yards | slow |
| Kneeling | 10 or 20 | 100 yards | slow |
| Standing | 10 or 20 | 100 yards | slow |
| Sitting or Kneeling from | | | |
| Standing | 10 or 20 | 100 yards | rapid or (sustained) |
| Prone from | | | |
| Standing | 10 or 20 | 100 yards | rapid or (sustained) |
| Standing | 10 or 20 | 200 yards | slow |

| Course | Shots | Distance | Type of Fire |
|--------------------------|----------|------------|--------------|
| Sitting or Kneeling from | | | |
| Standing | 10 or 20 | 200 yards | rapid |
| Prone from | | | |
| Standing | 10 or 20 | 300 yards | rapid |
| Prone | 10 or 20 | 500 yards | slow |
| Prone | 10 or 20 | 600 yards | slow |
| Prone | 10 or 20 | 1000 yards | slow |

National Match Course

| | | | |
|--------------------------|----|-----------|-------|
| Standing | 10 | 200 yards | slow |
| Sitting or Kneeling from | | | |
| Standing | 10 | 200 yards | rapid |
| Prone from | | | |
| Standing | 10 | 300 yards | rapid |
| Prone | 20 | 600 yards | slow |

8. TIME LIMITS

8.1 Computing Time—Time is not checked on each shot, but it is computed on the indicated allowance for each shot multiplied by the number of shots called for by the conditions of the match plus the time allowed for sighting shots. The time for sighting shots (when allowed) is in addition to the time for record shots.

8.2 Time Allowances:

(a) *Slow Fire*—The time limit for high power rifle competition is one minute per shot at ranges up to and including 600 yards. At ranges over 600 yards, the time limit is 1½ minutes per shot.

(b) *Rapid (Sustained) Fire*—In rapid (sustained) fire, the competitor is to be in a standing position when the command "Commence Firing" is given.

When the sitting or kneeling position is to be used, the time limits for 10 shots will be:

- (1) With any manually operated rifle . . . 60 seconds
- (2) With any semi-automatic rifle 50 seconds

When the prone position is to be used the time limits for 10 shots will be:

- (1) With any manually operated rifle . . . 70 seconds
- (2) With any semi-automatic rifle 60 seconds

In any rapid (sustained) fire match open to both manually operated and semi-automatic rifles, the time limits shall

be that prescribed for the manually operated rifle unless otherwise specified by the conditions of the match.

- (c) *Surprise Fire*—The time limit and range shall be as indicated in the conditions of the match.

8.3 Team Time—Team time will be based on the following:

- (a) Where sufficient firing points are assigned each team so *all* team members fire at the same time, total team time will be allowed in an individual match (or stage) of same type. (Example: 4 firers per team, 10 shots each at 200 yards, slow fire standing, no sighters; total team time—10 minutes.)
- (b) Where one target is assigned each team, the total team time will be equal to the number of firing members plus the total number of shots for that stage multiplied by the proper time for each shot and adding 3 minutes for each change of team member. (Example: 4 man team, 600 yards, slow fire prone, 20 shots each member, no sighters; 4 x 20 x 1 minute per shot plus 3 changes @ 3 minutes each = 89 minutes total team time. If the program requires “pair firing” only one change is necessary and total team time would be 84 minutes.)
- (c) Time not used for one stage may not be accrued and carried over to another.
- (d) In rapid (sustained) fire each team member must fire separately and time will be as allowed for individual match (stage).

8.4 Passage of Time—Range Officers will not voluntarily warn competitors of the passage of time. Competitors, and team captains in team matches, may inquire of range officers as to the time remaining before expiration of the time limit and Range Officers will give such information in a tone which will not disturb other competitors.

17. NATIONAL RECORDS

- **17.1 Where Scores for National Records Can Be Fired**—Scores to be recognized as National Records must be fired in NRA Competition as defined in Rule 21.1, paragraphs (c), (d), (e), and (f). National Records must be approved

by the NRA before being declared official. National Records may not be established during re-entry matches.

● **17.2 Scores to Be Used**—Scores must be complete scores for an entire scheduled match. Stage scores or scores for only part of a match will not be used for records.

● **17.3 Scores for National Individual Records**—Such scores must be fired in individual matches. No scores fired in a team match will be considered for recognition as an individual record.

For recognition as special group records ("Open," "Civilian," "Police," "Service," "Women," "Juniors") scores may be fired in either open or restricted matches. National Records will be recognized only when the competitor has entered such match.

● **17.4 Scores for National Team Records**—Such scores must be fired in matches where teams fire as a unit and no combination of individual match scores will be considered for recognition as a team record. For recognition as special group records ("Open," "Civilian," "Police," "Service," "Women," "Juniors") all members of the team must be members of the special group concerned (Rule 1.3). National Records will be recognized only when the competitor has entered such match. Teams must be bona fide teams as outlined in Rules 2.11 to 2.19. National Records will be recognized for "pickup" teams (teams made up of shooters who do not represent one of the groups outlined in Rule 2.11 to 2.19) when a tournament program specifically authorizes entry of this type team.

● **17.5 Courses of Fire for which National Records Are Recognized**—

NOTE: National High Power Rifle Records are maintained for scores fired over the following courses for "Open," "Police," "Service," "Civilian," "Women," and "Junior" Categories fired on the targets indicated and for metallic sights only unless indicated otherwise. The "Service" category includes Regular Service, Reserve Components, and National Guard.

NRA reduced targets for the military Targets, Rifle, Competition, Short Range (S-R) and Mid Range (M-R) are numbered as follows:

S-R-1—For 100-yd. firing to simulate 200-yd. standing and rapid fire

- S-R-2—For 100-yd. firing to simulate 300-yd. rapid fire
 M-R-3—For 100-yd. firing to simulate 500- or 600-yd. prone
 S-R-4—For 200-yd. firing to simulate 300-yd. rapid fire
 S-R-5—For 200-yd. firing (for ranges with small frames)
 M-R-5—For 200-yd. firing to simulate 500- or 600-yd. prone
 M-R-6—For 300-yd. firing to simulate 500- or 600-yd. prone

| RANGE | TARGET | TOTAL SHOTS | COURSE |
|---------------------|---------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. 100 yds. | S-R-1, S-R-2, M-R-3 | 50 | National Match Course 10 shots, Slow Fire, Standing (S-R-1); 10 shots, Rapid Fire, Sit- ting or Kneeling from Standing (S-R-1); 10 shots, Rapid Fire, Prone from Standing (S-R-2); 20 shots, Slow Fire, Prone (M-R-3) |
| 2. 200 yds. | S-R | 20 | 20 shots, Slow Fire, Standing |
| 3. 200 yds. | S-R | 20 | 20 shots, Rapid Fire, Sit- ting or Kneeling from Standing |
| 4. 200 yds. | S-R, S-R-4, M-R-5 | 50 | National Match Course 10 shots, Slow Fire, Standing (S-R); 10 shots, Rapid Fire, Sit- ting or Kneeling from Standing (S-R); 10 shots, Rapid Fire, Prone from Standing (S-R-4); 20 shots, Slow Fire, Prone (M-R-5) |
| 5. 300 yds. | S-R | 20 | 20 shots, Prone from Standing, Rapid Fire |
| 6. 200, 300 yds. | S-R | 30 | 10 shots, Slow Fire, Standing at 200 yds.; 10 shots, Rapid Fire, Sit- ting or Kneeling from Standing at 200 yds.; 10 shots, Rapid Fire, Prone from Standing at 300 yds. |

National Match Course

| RANGE | TARGET | TOTAL | | COURSE |
|---------------------|---------------|--------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | TARGET | SHOTS | |
| 7. 200, 300 yds. | S-R, M-R-6 | 50 | 10 | shots, Slow Fire, Standing at 200 yds. (S-R); 10 shots, Rapid Fire, Sit- ting or Kneeling from Standing at 200 yds. (S-R); 10 shots, Rapid Fire, Prone from Standing at 300 yds. (S-R); 20 shots, Slow Fire, Prone at 300 yds. (M-R-6) |
| 8. 500 yds. | M-R | 20 | 20 | shots, Slow Fire, Prone |
| 9. 600 yds. | M-R | 20 | 20 | shots, Slow Fire, Prone |

80-Shot Regional Course

| | | | | |
|---------------------------------------|-------------|----|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10. 200, 300, 600 (500) yds. | S-R, M-R | 80 | 20 | shots, Slow Fire, Standing at 200 yds. (S-R); 20 shots, Rapid Fire, Sit- ting or Kneeling from Standing at 200 yds. (S-R); 20 shots, Rapid Fire, Prone from Standing at 300 yds. (S-R); 20 shots, Slow Fire, Prone at 600 (500) yds. (M-R) |
|---------------------------------------|-------------|----|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

100-Shot Regional Course

| | | | | |
|---------------------------------------|-------------|-----|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11. 200, 300, 600 (500) yds. | S-R, M-R | 100 | 20 | shots, Slow Fire, Standing at 200 yds. (S-R); 20 shots, Rapid Fire, Sit- ting or Kneeling from Standing at 200 yds. (S-R); 20 shots, Rapid Fire, Prone from Standing at 300 yds. (S-R); 40 shots, Slow Fire, Prone at 600 (500) yds. (M-R) |
|---------------------------------------|-------------|-----|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

100-Shot Regional Course (Cont.)

| RANGE | TARGET | TOTAL SHOTS | COURSE |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12. 200, 300, 600 (500) yds. | S-R, M-R | 50 | National Match Course 10 shots, Slow Fire, Standing at 200 yds. (S-R); 10 shots, Rapid Fire, Sit- ting or Kneeling from Standing at 200 yds. (S-R); 10 shots, Rapid Fire, Prone from Standing at 300 yds. (S-R); 20 shots, Slow Fire, Prone at 600 (500) yds. (M-R) Sights) |
| 13. 1000 yds. | C | 20 | 20 shots, Slow Fire, Prone |
| 14. 1000 yds. | C | 20 | 20 shots, Slow Fire, Prone (Any Sights) |
| 15. 200, 300, 600 (500), C 1000 yds. | S-R, M-R, C | 60 | National Long Range Course 10 shots, Slow Fire, Standing at 200 yds. (S-R); 10 shots, Rapid Fire, Sit- ting or Kneeling from Standing at 200 yds. (S-R); 10 shots, Rapid Fire, Prone from Standing at 300 yds. (S-R); 10 shots, Slow Fire, Prone at 600 (500) yds. (M-R); 20 shots, Slow Fire, Prone at 1000 yds. (C) |
| 16. | The current National Championship Aggregate Course. | | |
| 17. | Team Matches. Four man teams for fired matches as listed under items 1, 4, 6, 7, 10, 11, 12, 13, 14 and 15. Six man teams for fired matches as listed under items 7, 13 and 14. | | |

19. NATIONAL HIGH-POWER RIFLE CLASSIFICATION

19.1 Classified Competitors—Are all individuals who are officially classified by the NRA for High Power Rifle competi-

tion, or who have a record of scores fired over courses of fire used for classification (See Rule 19.4) which have been recorded in a Score Record Book.

19.2 Unclassified Competitor—Is a competitor who has not fired in NRA High Power Rifle competition during the previous three successive calendar years or who has not been classified as a Master. Such unclassified competitor shall fire through his first tournament (or first tournament following the loss of his classification—Rule 19.9) in the Master Class.

19.3 (Blank)

19.4 Matches Used for Individual Classification—Scores used for classification and reclassification are those fired in metallic sight matches only in NRA competition as defined in rule 21.1 (except Postal Matches) over the following courses of fire and according to the indicated conditions:

- (a) 100 yds. Courses of fire listed for National Records in Rule 17.5.
- (b) 200 yds. Courses of fire listed for National Records in Rule 17.5.
- (c) 300 yds. Courses of fire listed for National Records in Rule 17.5.
- (d) 500/600 yds. Courses of fire listed for National Records in Rule 17.5 except for Any Sights.

Scores from Registered Leagues may be used during the league season in Score Record Books (Rule 19.14) but will only be used by the NRA Headquarters at the end of the league firing season for issue of Official Classification Cards.

19.5 Compilation of Scores for Classification Average—All above complete match scores will be combined for classification.

19.6 Assigned Classification—A competitor who has an earned classification (a classification obtained through his Score Record Book or an Official NRA Classification Card) for one type of competition in grouping listed below will be assigned the same classification in any other type in which he is not classified in the same group:

Smallbore and High Power Rifle:

- | | |
|----------------------|-------------------------|
| (a) Indoor Position | (d) NRA Three Position |
| (b) Outdoor Position | (e) International Rifle |
| (c) Outdoor Prone | |

If he has a classification in more than one type in the list, he shall use the higher classification. In his second tournament in the new type, he will use his Score Record Book rather than his assigned classification.

19.7 Lack of Classification Evidence—It is the competitor's responsibility to have his NRA Official Classification Card or Score Record Book with required scores for temporary classification (see Rules 19.1 and 19.14) to present such classification evidenced when required. Any competitor who cannot present such evidence will fire in the Master Class. A competitor's classification will not change during a tournament. A competitor will enter a tournament under his correct classification and fire the entire tournament in that class. Should it be discovered during a tournament that a competitor has entered in a classification lower than his current rating, the tournament records will be corrected to show the correct classification for the entire tournament.

19.8 Competing in a Higher Class—Any individual or team may elect, before firing, to compete in a higher classification than the one in which classified. Such individual or team must fire in such higher class throughout that tournament and not revert to earned classification for any event in that tournament.

When there are insufficient entries in any class to warrant an award in that class according to the match program conditions, the individual or team concerned may be moved by the Tournament Executive Officer to a higher class provided this change is made prior to the individual or team concerned having commenced firing in the tournament.

19.9 Obsolete Classifications and Scores—All classifications and scores (including temporary, Rule 19.14) except Master, shall become obsolete if the competitor does not fire in NRA competition at least once during three successive calendar years. Master classifications and scores shall become obsolete if the competitor does not fire in NRA competition at least once during five successive calendar years. Lifetime Master classifications will not become obsolete.

19.12 Team Classification—Teams are classified by computing the "team average" based on the classification of each firing member of the team. To compute this "team average" the key in Table No. I for the different classes will be used, and the team total divided by the number of firing members of the team. Any fractional figure in the team average of one half or more will place team in next higher class. The "team

average" will establish classification of the team as a unit but will not affect in any way the individual classification of the team members.

Table No. I

| Team | | | |
|--------------|-----|--------------------|-----|
| Class | Key | Class | Key |
| Master | 4 | Sharpshooter | 2 |
| Expert | 3 | Marksman | 1 |

• 19.15 Individual Class Averages—Competitors will be classified and NRA classification cards will be issued according to the following schedules.

Table No. II

Individual

Scores fired on Targets, Rifle, Competition, Short Range and Mid Range

| | | | |
|--------------|----------------|----------------|---------------|
| Master | 94.0 and above | Sharpshooter . | 84.0 to 88.99 |
| Expert | 89.0 to 93.99 | Marksman | Below 84.0 |

19.16 Establishing Classification—A competitor will be officially classified by the NRA when the total score for a minimum of eighty (80) shots has been reported. However, classification averages will be computed only after the total score for a tournament or league has been posted, and, therefore, the average may be based on a greater number of shots, but will not be based upon a lesser number. Total scores so reported to the NRA will be posted to the Classification Control Card for the competitor concerned. When the scores for the stated minimum of eighty (80) shots (or more if this minimum is reached during the scores of any tournament or league) have been so posted, the average score per ten (10) shot string will be computed. The competitor will be sent an Official NRA Classification Card based on the average so computed and according to the table in Rule 19.15 which classification will become effective the date shown on the card issued by NRA.

An individual in a Master class may upon application to the NRA be certified as a Lifetime Master and will be issued a special card so indicating. A competitor may be a Lifetime Master for one type of competition and in a lower class for other types. The election herein provided for, once made, shall be irrevocable.

19.17 Reclassification—A competitor who has been classified by the NRA will be reclassified as follows:

- (a) A record of all completed NRA competition (except Postal Match) scores fired by a classified competitor will be maintained in the NRA Headquarters.
- (b) When the total score for a minimum of eighty (80) shots has been posted, the competitor's average will be established by dividing the total score by the number of ten (10) shot strings represented. This average will be computed as outlined in Rule 19.16 at the end of the tournament or league in which the minimum of eighty (80) shots, or more, have been posted. When a competitor's new average places him in a higher class he will be reclassified accordingly.
- (c) A competitor who believes his classification is too high may file a request with the NRA Administrative Staff that his classification be lowered. Such a competitor must remain in the class concerned until at least two hundred forty (240) shots have been posted to his classification record. When the average of such shots places the competitor in a lower class he will be reclassified accordingly. A competitor who has been so classified downward, and who by scores fired in NRA competition (except NRA Postal Matches) has again earned his former classification, which that competitor was allowed to vacate, then that classification shall become final and the competitor shall retain the earned classification until reclassified into a higher class as outlined in Rule 19.17.
- (d) A reclassified competitor shall be sent a new classification card which will become effective the date shown on card issued by NRA.
- (e) A Lifetime Master will not be reclassified.

19.21 Lifetime Master—An individual in a Master class may upon application to the NRA be certified as a Lifetime Master and will be issued a special card so indicating. A competitor may be a Lifetime Master for one type of competition and in a lower class for other types. The election herein provided for, once made, shall be irrevocable.

21. NRA COMPETITIONS

These are the same as for Smallbore Rifle Rules except the following competition is added.

- (j) *Police Combat Tournaments*—Registered tournaments are required to have turning targets. Approved tour-

naments may use stationary targets with timing being done with a whistle. Conducted under NRA Police Combat rules.

Bench Rest Shooting

Excerpts from the rules of the National Bench Rest Shooters Association are given below. For full information write the organization.

I. OBJECTS OF THE NATIONAL BENCH REST SHOOTERS ASSOCIATION, INC.

1. The development and encouragement of extreme accuracy in rifles, ammunition, equipment and shooting methods.
2. To standardize on a national basis the entire Bench Rest Shooting program so that targets, ranges, scoring methods, records and match procedure will be uniform and comparable.
3. To assist and encourage any individual or organization in the promotion of Bench Rest Shooting.

B. Definitions

The following words, when used in these Rules and Regulations, shall have the meanings herein set forth:

1. **Bench.** A bench shall be a rigidly constructed table being of a height to permit a shooter of more or less than average height to sit comfortably thereat by merely increasing or decreasing the height of the stool on which he sits. It shall preferably be constructed to permit firing by either a right or left handed shooter.

2. **Bench Rest Rifle.** Any rifle having a barrel 18 or more inches long, measured from the face of the bolt to the muzzle, and having a safely operated firing mechanism.

Note: For minimum barrel length, the legal method of measurement from face of the bolt shall be employed, but for taper, the front of the receiver ring shall be the measurement base.

3. **Heavy Varmint Rifle.** Any rifle having a safe manually and mechanically operated firing mechanism, weighing not more than 13½ lbs. inclusive of sight. With a stock having a flat or convexed forearm and total stock width not more

than 3", having a toe formed by an acute angle not greater than that formed by a straight line drawn from the toe of a substantially vertical butt starting at a point at least 4" below the axis of the bore and extending forward to the bottom of the barrel at a point 18" forward of the bolt face. A barrel not less than 18" long, a diameter at and not more than 5" ahead of the bolt face of not more than 1.250" and a diameter at any point between the muzzle and a point 5" ahead of the bolt face not greater than would be defined by a straight taper between such point 5" in front of the bolt face at 1.250" diameter and the muzzle at .900" diameter at 29".

The barrel may be attached to the receiver, bedding blocks or sleeve or combination thereof for a distance of no more than four (4) inches, measured from the face of the bolt. The overall length of the receiver, bedding blocks or sleeve or combination thereof not to exceed fourteen (14) inches. (Maximum dimensions shall not include normal scope blocks and sight bases.)

4. **Light Varmint Rifle.** Any rifle of not more than 10½ pounds in weight inclusive of sights and otherwise meeting the requirements of the heavy varmint rifle.

5. **Sporter Rifle.** Any rifle otherwise meeting the requirements of the light varmint rifle, but of not less than caliber .23.

8. **Range for Registered Tournaments.** A place to shoot having not less than 5 benches on a firing line; it shall have sturdy target frames at measured distances from the firing line not less than 100 yards, preferably at 100 and 200 yards, and desirably at 100 and 200 yards and 300 yards; the target frames at 100 and 200 yards shall be served with moving backer strips or cards, and the target frames at 300 yards may be served with moving backer strips or cards; the bullet stop shall be adequate to stop bullets of any caliber and shall be sufficiently high to intercept ricochets.

13. **Rests.** (a) A front rest shall support the front part of a rifle; a rear rest shall support the rear part of a rifle; neither rest may be attached to the bench, the rifle or to the other; and each shall be movable independently of the other. (See Section III F & G.)

(b) **Unrestricted Rests** may incorporate guiding means, and adjustments for elevation and windage in either or both components.

II. TARGETS

A. **Bench Rest Competition.** The official 100-yard target for all registered bench rest rifle competition (designated

as BR 100-2) shall have a ten (10) ring of one half inch outside diameter. The nine (9) ring shall be one inch outside diameter. Succeeding rings shall increase one half inch in outside diameter to and including the six (6) ring. The Aiming Square shall be one (1) inch square and placed at 12 o'clock tangent to the nine ring. Thickness of sides of the aiming square will be one quarter ($\frac{1}{4}$) inch. The target shall have a black border line forming a rectangle $3\frac{1}{2} \times 4\frac{3}{4}$ inches in size, which will be centered on a target card of approximately 8 x 8 inches with no printing except the target inside the border line. (A target of exactly the same ring, aiming square and border line dimensions but printed on a smaller size target card [designated at BR-100] is available for practice and non-registered competition, only.)

Targets for the longer ranges will be increased in direct proportion to the range in all ring and aiming square dimensions, except in ring thickness. Overall size of the 200-yard target will be approximately 8 x 8 inches with a black border line $\frac{1}{2}$ inch from the target card edge. The overall size of the 300-yard target card will be 18 x 18 inches with black border line $\frac{1}{2}$ inch from the target card edge.

B. Varmint Rifle Competition. Official targets for the National Varmint Rifle Championships shall be the BR-100-2 target at 100 yards and the BR-200 target at 200 yards. At other registered tournaments the BR-200 target may be used at 100 yards range and the SPORTER target used at 200 yards range, at the option of the tournament sponsors.

C. Sporter Rifle Competition. The Official Sporter target shall be the regular BR-100-2 at 100 yards, and the BR-200 at 200 yards. The former targets of BR-200 at 100 yards and the larger special sporter target at 200 yards may be used until the supply is exhausted, in registered matches only.

III. TOURNAMENTS

A. Tournaments shall be of two general classes: (a) Registered, and (b) Unregistered. Only Registered Tournaments shall be recognized for record purposes. All tournaments shall consist of Any Sight matches with no coaching permitted.

B. Registered Tournaments may be held only by clubs affiliated with NBRSA which are in good standing and which have the facilities and equipment required to conduct a shoot under the procedures required by the Association. Registered Tournaments may be held only on dates approved by the Director of the Region having jurisdiction of the Club.

D. Competitors: Subject to eligibility rules of the Club conducting the shoot and complying with Registration requirements, any shooter may compete in a Registered Tournament. (See Section V A & B.)

E. Kinds of Tournaments: Registered Tournaments may be held for any one or more of the recognized classes of Rifles. (See Definitions.)

1. Bench Rest Rifles
2. Heavy Varmint Rifles
3. Light Varmint Rifles
4. Sporter Rifles

F. Bench Rest Rifles, Rests: All registered matches shall be conducted permitting shooting with unrestricted rests. Unrestricted rests to comply with the definitions of Section I B, 13 (a) and (b) of these official rules.

G. Varmint and Sporter Rifles, Rests: Tournaments for Heavy Varmint Rifles, Light Varmint Rifles, and Sporter Rifles shall be fired with Sand Bag front rests, which may be supported on a pedestal which shall not coact with the sand-bag to restrain recoil or form a guiding means, and a rear rest, comprising a sand-bag supporting the rifle between the rear of the pistol grip and the toe of the buttstock.

J. Courses of Fire: The following courses of fire shall be required for Championship Tournaments.

1. National Bench Rest Championship. The course of fire shall cover four days of shooting. The first and second day shall provide five ten-shot matches at 100 yards. The third and fourth days shall provide five ten-shot matches at 200 yards. The non-fired matches shall be: First Day Aggregate; Second Day Aggregate; 100 Yard Aggregate, the winner of which shall be the National One Hundred Yard Champion; Third Day Aggregate; Fourth Day Aggregate; 200 Yard Aggregate, the winner of which shall be the National Two Hundred Yard Champion; Grand Aggregate, combining the 100 and 200 Yard Aggregates, expressed in minute of angle, the winner of which shall be the National Bench Rest Shooting Champion.

2. Regional Bench Rest Championship Tournaments. The courses of fire shall be five ten-shot matches at 100 yards and five ten-shot matches at 200 yards. Non-fired events shall be: 100 Yard Aggregate, the winner of which shall be the One Hundred Yard Regional Champion; 200 Yard Aggregate, the winner of which shall be the Two Hundred Yard Regional Champion; and Grand Aggregate, combining the 100 Yard and 200 Yard Aggregates expressed in

minute of angle, the winner of which shall be the Regional Bench Rest Champion.

3. Heavy Varmint, Light Varmint and Sporter Classes. The championship courses of fire shall be five five-shot matches at 100 yards and five five-shot matches at 200 yards. The non-fired matches shall be: 100 Yard Aggregate for each class, the winner of which shall be the One Hundred Yard Champion; 200 Yard Aggregate for each class, the winner of which shall be the Two Hundred Yard Champion; Grand Aggregate for each class, combining the 100 and 200 Yard Aggregates expressed in minute of angle, the winner of which shall be the Champion.

4. The Host Club is required to start each day's shooting with a warm-up match. Also each change of range or class.

K. **Time Limits:** For the first match of the day or the first match after a change of distance, fifteen minutes shall be allowed for a ten shot match and ten minutes for a five shot match. For all other matches twelve minutes shall be allowed for ten shots and seven minutes for five shots. Not less than thirty minutes shall be allowed between the end of a relay of one event and the start of the same relay of the next event. There shall be no exception to the requirement that all competitors shall complete their string of fire within the time allowed. At all registered matches time limits shall be determined by a timer calibrated in seconds.

BENCH REST COMPETITION WITH HUNTING RIFLES

1. Purpose

(a) To attract shooters not previously engaged in Competitive Target Shooting.

(b) To improve hunting rifle accuracy and effects of components used therein.

(c) To better acquaint the rifleman with his rifle and Competitive Sportsmanship.

2. Rifles

(a) Stocks must be conventional hunting design and shape, not over $2\frac{1}{4}$ inches wide.

(b) Rebarreling, restocking and special triggers permitted. Must have operative safety.

(c) Bolt action receivers be no larger in diameter than 1.400 inches and no longer than $10\frac{1}{4}$ inches. (This does not mean to exclude any quantity produced receiver.) Projections

on diameter not included, such as, recoil lug, sight bases, safety and similar items. Custom actions produced in quantities of less than 1000 per year shall not be legal, unless approved by the directors.

(d) A hunter rifle barrel not less than 18 inches long, a diameter at and not more than four (4) inches ahead of the bolt face, of not more than 1.250 inches and a diameter at any point four (4) inches ahead of the bolt face not greater than would be defined by a straight taper between such point four (4) inches in front of the bolt face at 1.250 inches and the muzzle at .750 inches diameter at 26 inches from the bolt face.

(e) No blocking or sleeving, 180° degree or otherwise of barrel or action allowed. Barrel and action must be removable from the stock without destruction of stock. Nothing may be fastened to the barrel except sights, sight bases and original manufacturers attachments.

(f) Bore diameter .236 inches (6mm) or more. Case capacity not less than .30-30 measured full of water. (A list of eligible minimum cases will be supplied.)

(g) A magazine shall hold two or more loaded rounds of ammunition that will feed, chamber and fire.

(h) Any sights. Scopes must be 6X or less. Variables must be set and taped. Target mounts not allowed.

(i) Rifle and scope not to exceed ten (10) pounds in weight.

3. Course of Fire

(a) Target for hunter class to be N. B. R. S. A., Inc. supplied hunter target (6 bull).

(b) Clubs interested only in Hunter Rifle matches may pay an affiliation fee of \$5.00 to NBRSA and have approved Hunter Rifle matches. Clubs already affiliated may pay the added \$5.00 and hold approved Hunter Rifle matches. Each affiliated club holding these approved Hunter Rifle matches will be provided by NBRSA with classification cards to issue to their competitors. Three classifications with three card colors. Classes are: 1—Novice Hunter, 2—Hunter, 3—Master Hunter.

(f) Rifles fired from benches (Single Loads Only) on non-conforming pliable sand-bags, both front and rear. Adjustable pedestal with sand-bags under forearm are permitted. Blocks, boxes or such to raise sand-bags to get proper elevation are permitted. No machine or other rests that can return rifle to battery or which retard recoil.

5. Classification

(a) Scores for classification are (aggregate score for five (5) five-shot matches): 228 to 250 inclusive—Master Hunter; 200 to 227 inclusive—Hunter; 199 and less—Novice Hunter.

(b) Any competitor firing in first competition shall fire in Master Hunter class.

(c) Lowering of classification: On firing a score less than his classification in two successive tournaments, competitor will be reclassified to a lower class.

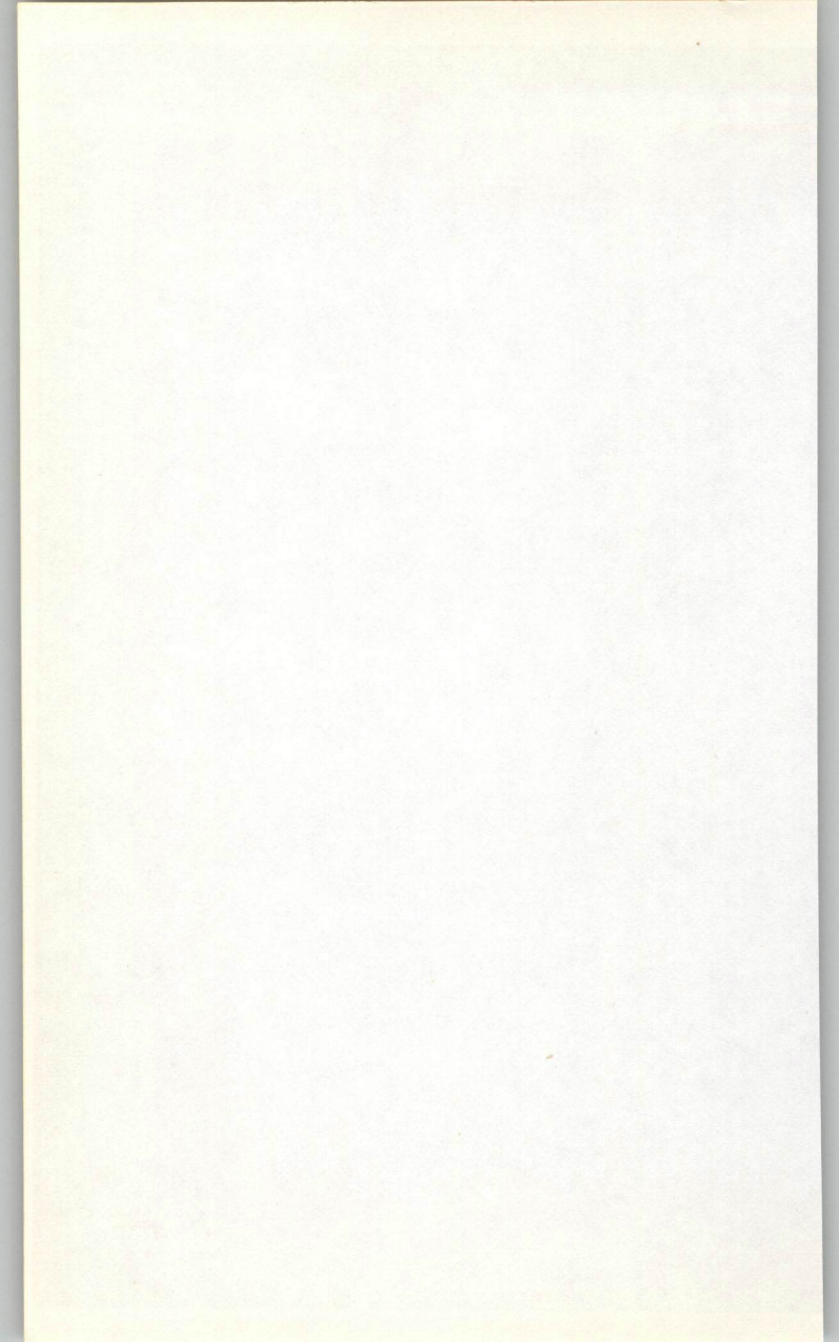
(d) Raising of classification: Any competitor who fires (scores) in a higher class in one tournament will be reclassified at the end of the tournament.

(e) Competitors upon registration must leave (classification) cards with the Stat Officer until end of tournament when they will either be marked and returned or a new class card issued.

(f) Anyone may elect to shoot in Master Hunter class, but a Master is not eligible for Hunter class awards. Awards will be provided and the number of all awards will depend on number of class entries.

PART TWO

Shotguns and Shotshells



Types of Shotguns

There are six basic types: *single-shot break action*; *side-by-side double barrel*; *over-and-under double barrel*; *bolt-action repeater*; *pump-action repeater*, and *autoloader*. The single-shot is light, inexpensive, and safe for the beginner, and comes in either hammer or hammerless design, with most having automatic extractors. Double-barrels, either side-by-side or over-and-under, have the advantage of two different chokes. Triggers are double, single selective, or single non-selective. The barrel you shoot first may be selected with the double trigger, or the single-selective trigger. The over-under design has less recoil than the side-by-side double, plus the advantage of a narrower sighting plane. The pump action is light, but fast, and somewhat cheaper than the autoloaders. It may come with interchangeable barrels or with variable-choke devices. The autoloader has the distinct advantage of faster firing and one more shot than the double. It is expensive, heavy to handle, and dangerous if not handled with caution.

U.S. Shotguns: Autoloading

| Model | Gauge | Action |
|---------------------------------------------|-------------------------------------------------------------------------------------------------|-----------------|
| Browning Auto-5, Light 12, 20, and Sweet 16 | 12, 20, 16 | Recoil operated |
| Browning Auto-5, Magnum 12 and 20 | 12, 20; chambered for 3" and 2¾" shells | Recoil operated |
| Browning Auto-5 Light-weight Buck Special | 12, 16, 20 and 3" magazine in 12 and 20 | Recoil operated |
| Hi-Standard Supermatic Auto | 12 and 12, 20 magazine (3" magazine) deer gun 20 ga. in all bbls.; will handle 2¾" or 3" shells | Gas operated |
| Hi-Standard Supermatic Skeet Gun | 12, 20 ga. | Gas operated |
| Hi-Standard Supermatic Trap Gun | 12 ga. only | Gas operated |

| Barrel and Choke | Weight | Features |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26"—12 ga. in Skeet, C, IC —16 ga. in Skt., C, IC, M 20 ga. in Skt., C, IC, M 28"—12 ga. in Skt., M, F —16 ga. in M, F —20 ga. in Skt., M, F 30"—12 ga. in F | 12 ga.—7 lbs. 3 oz.—7 lbs. 11 oz. 16 ga.—6 lbs. 10 oz.—7 lbs. 1 oz. 20 ga.—6¼ lbs.—6 lbs. 7 oz. | Double extractors, inter- changeable bbls., maga- zine cutoff, cross-bolt safety; plain or ventilated rib; 12 ga. and 20 ga. with 26" or 28" bbl., bored for skeet shooting |
| 26"—20 ga. in IC, M, F 28"—20 and 12 ga. in M, F 30"—12 ga. in F 32"—12 ga. in F | 20 ga.—7 lbs. 12 ga.—8¾ lbs. | Cross-bolt safety, lft. or rt. hand; plain or venti- lated rib |
| 24" bbl. specially choked and bored for rifled slug and buck- shot load | 12 ga.—7 lbs. 16 ga.—6 lbs. 6 oz. 20 ga.—6 lbs. 2 oz. 12 ga., 3" mag.— 8¼ lbs. 20 ga., 3" mag.— 6 lbs. 15 oz. | Rear sight adj. for wind- age and elevation; gold bead front; also avail. in std. buck special (slightly heavier) |
| 26"—12, 20 ga.—IC 28"—12, 20 ga.—M, F 30"—12 ga. only—F; also avail. in 3" magazine special duck gun 27"—12, 20 ga.—adj. | 12 ga.—7½ or 8 lbs. (duck gun) 20 ga.—7 lbs. | Plain bbl. or vent. rib; cross-bolt safety; trophy or deluxe grade |
| 26"—Skeet | 12 ga.—7½ lbs. 20 ga.—7 lbs. | Same as regular super- matic exc. barrel |
| 30"—Full | 8 lbs. | Same as regular super- matic exc. bbl. and longer pull |

U.S. Shotguns: Autoloading (Cont.)

| Model | Gauge | Action |
|------------------------------------|------------------------------------------------|--------------|
| Ithaca Model 51 Feather-light Auto | 12, 20 ga.; also avail. in 3" magazine | Gas operated |
| Ithaca Model 51 Deer Slayer Auto | 12, 20 | Gas operated |
| Ithaca Model 51 Trap | 12 | Gas operated |
| Ithaca Model XL 300 | 12, 20; 20 ga. handles either 3" or 2¾" shells | Gas operated |
| Ithaca Model XL 900 | 12, 20; 20 ga. handles either 3" or 2¾" shells | Gas operated |
| Remington Model 1100 Auto | 12, 16, 20 | Gas operated |
| Remington Model 1100 Magnum | 12, 20; 3" and 2¾" magazine | Gas operated |
| Remington Model 1100 SA Skeet Gun | 12, 20 | Gas operated |

| Barrel and Choke | Weight | Features |
|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26"—12, 20 ga.—IC, Skt. 28"—12 ga.—M, F —20 ga.—M, F 29"—12 ga.—Skt. 30"—12 ga.—F | 7½ lbs. Mag.— 8½ lbs. | Std. or vent. rib; std. or deluxe grade; extra bbls. avail.; 12, 20 ga. also has std. or deluxe skeet models |
| 24" bbl., 2¾" chamber | 12 ga.—7½ lbs. 12 ga.—7¼ lbs. | Bored for rifled slugs; Raybar blade front sight, rear sight adj.; grooved for scope |
| 28"—IM, F 30"—IC, F | 7½ lbs. | Has longer pull than std.; also avail. in Monte Carlo stock |
| 26"—12, 20 ga.—IC, Skt. 28"—12, 20 ga.—M, F 30"—12 ga.—F —20 ga.—M, F 30" Trap—M, F | 12 ga.—7½ lbs. 20 ga.—6¾ lbs. | Std. or vent. rib; reversible safety; field, trap, or skt. model; Raybar front sight on vent. rib |
| Same as XL 300 24"—reverse choke, 12, 20 ga. | Same as XL 300 | Std. or vent. rib; field, trap (12 ga. only), skt. or slug model; Raybar front sight—field grades; Bradley-type front sight and middle bead—target grades; reversible safety |
| 26"—12, 16, 20 ga.—IC 28"—12, 16, 20 ga.—M, F 30"—12 ga.—F 30"—12 ga., trap grade —M, F | 12 ga.—7½ lbs. 16 ga.—7¾ lbs. 20 ga.—7¼ lbs. Trap grade—8½ lbs. | Plain bbl. or vent. rib; also avail. in lft-hd. models; cross-bolt safety |
| 28"—20 ga.—M, F 30"—12 ga. | 7¾ lbs. | Plain or vent. rib; recoil pad; avail. in lft-hd. model |
| 26"—Remington Skt. or Cutts Compensator | 7½ lbs. | Vent. rib; ivory bead front, white metal rear sight; also avail. in SB grade (better stock) |

U.S. Shotguns: Autoloading (Cont.)

| Model | Gauge | Action |
|---------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Remington 1100 TB Trap Gun | 12 | Gas operated |
| Remington 1100 Deer Gun | 12, 20 | Gas operated |
| Remington 1100 Small Gauge | 28 or .410. 3"—.410 field grd. 2½"—.410 skeet 2¾" and 28 ga. field and skeet | Gas operated |
| Remington 1100 20 Ga. Lightweight or Magnum Lightweight | 20 or 20 ga. magazine | Gas operated |
| Smith & Wesson Model 1000 | 12 ga.—2¾" | Gas operated |
| Universal Auto Wing Shotgun | 12 ga.—2¾" | Recoil operated |
| Weatherby Centurion Auto | 12 ga.—2¾" | Gas operated |
| Winchester 1400 Auto Mark II | 12, 16, 20 | Gas operated |

| Barrel and Choke | Weight | Features |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 30"—modified or full choke | 8½ lbs. | Vent. rib; also avail. in Monte Carlo; ivory bead front sight, white metal rear |
| 22"—choked for slugs and buckshot | 7¼ lbs. | Rifle sights avail. for windage and elevation |
| 25"—IC, M, F | 28 ga.—6¼ lbs. 28 ga., vent. ribs—6½ lbs. 28 ga., skeet, .410 plain bbl.—6¾ lbs. .410 ga., vent. ribs—7 lbs. .410 ga., skeet—7¼ lbs. | Plain bbl. or vent. rib; cross-bolt safety |
| 26"—20 ga.—IC 28"—20; 20 ga. magazine M, F | 6½ lbs. mag.— 6¾ lbs. | Plain bbl. or vent. rib; mag. has recoil pad |
| 26"—Skt., IC 28"—IM, M, F | 28"—7½ lbs. | Vent. rib/front and middle beads; cross-bolt safety; interchangeable rt. or lft. hand |
| 26"—IC 28"—M 30"—F | About 7 lbs. | Cross-bolt safety, interchangeable bbls. |
| 26"—Skt., IC, M 28"—M, F 30"—F | 26"—7 lbs. 9¼ oz. 28"—7 lbs. 10½ oz. 30"—7 lbs. 11¾ oz. | Cross-bolt safety, lft. or rt. hand; interchangeable bbls.; field, skt. or trap grade; recoil pad |
| 26"—IC 28"—M, F 30"—F, 12 ga. only | 26", 20 ga.—6½ lbs. 26", 16, 20 ga.—6¾ lbs. | Plain or vent. rib; cross-bolt safety; interchangeable bbls. |

U.S. Shotguns: Autoloading (Cont.)

| Model | Gauge | Action |
|------------------------------------------|--------|--------------|
| Winchester 1400 Auto Mark II Skeet | 12, 20 | Gas operated |
| Winchester 1400 Auto Mark II Trap | 12 | Gas operated |
| Winchester 1400 Auto Mark II Deer Gun | 12 | Gas operated |

U.S. Shotguns: Slide Action

| Model | Gauge | Action |
|-------------------------------------------|------------------|-------------------------------------------|
| H & R 440 Pump | 12, 16, 20 | Hammerless, side ejecting, slide action |
| Hi-Standard Flite-King Deluxe Pump Gun | 12, 20, 28, .410 | Free-falling, slide action; side ejection |
| Hi-Standard Trophy Grade Skeet Gun | 12, 20, 28, .410 | Same as Flite-King Deluxe |
| Hi-Standard Trophy Grade Trap Gun | 12 | Same as Flite-King Deluxe |

| Barrel and Choke | Weight | Features |
|----------------------------|---------|------------------------------------------------------------------------|
| 26"—Skeet | 7½ lbs. | Metal middle, red front sight; vent. rib |
| 30"—Full | 8½ lbs. | Regular or Monte Carlo stock; vent. rib; metal middle, red front sight |
| 22"—Bored for rifled slugs | 6½ lbs. | Ramp front sight, adj. open rear |

| Barrel and Choke | Weight | Features |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| 24"—12, 20 ga., IC 26"—12, 20 ga., IC, M 28"—12 ga., F, M —16 ga., M —20 ga., F, M 30"—12 ga., F | 6¼ lbs. | Recoil pad; H&R 442 same exc. vent. rib, checkering |
| 20"—12 ga., C 26"—12 ga., IC 26"—20 ga., IC — .410, F 27"—12 ga.—adj. —20 ga.—adj. 28"—12 ga., F, M —20 ga., F, M 30"—12 ga., F | 7 lbs. 7¼ lbs. 6 lbs. 6 lbs. 7¼, 7½ lbs. 6¼ lbs. 7¼, 7½ lbs. 6¼, 6 lbs. 7¼, 7½ lbs. | Plain or vent. rib, deluxe or trophy grade |
| 26"—Skeet choke | 12 ga.—7½ lbs. 20 ga.—6¼ lbs. 28 ga., .410— 6 lbs. | Vent. rib; no recoil pad |
| 30" Full | 7¾ lbs. and 7 lbs. | With or without Monte Carlo stock |

U.S. Shotguns: Slide Action (Cont.)

| Model | Gauge | Action |
|-----------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------|
| Ithaca Model 7 Featherlight | 12, 16, 20 | Slide, takedown, bottom ejection |
| Ithaca 37 Deerslayer | 12, 16, 20 | Same as featherlight |
| Marlin Model 120 Magnum Pump Gun | 12 ga.—2¾" and 3" | Hammerless, side ejecting, slide action |
| Marlin 120 Trap Gun | 12 | Same as 120 Mag. |
| Mossberg 500 Pump Gun | 12, 16, 20, .410. 2¾" and 3" except 3" in 16 ga. Super grade has 12, 20 ga. only | Slide, takedown, side ejection; straight-line feed |
| Mossberg 500 Pigeon Grade | Same as 500 Pump | Same as 500 Pump |
| Remington 870 Wingmaster Pump Gun | 12, 16, 20 | Takedown, slide action |
| Remington 870 Magnum | 12, 20—3" | Same as std. 870 |

| Barrel and Choke | Weight | Features |
|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26"—12, 16, 20 ga. 28"—12, 16, 20 ga. 30"—12 ga. F, M, or IC for all barrels | 12 ga.—6½–7 lbs. 16 ga.—6–6¾ lbs. 20 ga.—5¾–6 lbs. | Plain or vent. rib; std., deluxe, or supreme grade; supreme grade also with trap or skt. stocks; Ithaca Raybar front sight, cross-bolt safety |
| 26" or 20" bbl. designed for rifled slugs | 12 ga.—6½ lbs. 16 ga.—6 lbs. 20 ga.—5¾ lbs. | Std. or super deluxe grades; with iron sights; telescope optional |
| 26"—IC, rifled slug 28"—M 30"—F with vent. ribs 40"—F | 7¾ lbs. | Interchangeable bbls.; slide lock release; cross-bolt safety; front and middle sights; recoil pad; slug bbl. tapped for scope; comes with rifle sights |
| 30"—F, M —Trap choke | | Monte Carlo stock, vent. rib bbl. |
| 26"—12, 16, 20 ga., IC and C-Lect (adj.) —.410 ga., F, M Avail. in std., C-Lect choke, Mag. and slug bbl. | 12 ga.—6¾ lbs. 16 ga.—6½ lbs. 20 ga.—6 lbs. .410 ga.—5¾ lbs. 12 ga. Mag.— 8 lbs. | Safety on receiver top; field or super grade (vent. ribs); interchangeable bbls.; .410 avail. with F, M, or Skt. bbl./vent. rib |
| Same as Model 500 but with vent. rib, recoil pad; also comes in trap gun with 30" full choke bbl. | | |
| 26"—IC 28"—M, F 30"—F 18" or 20"—12 ga., riot bore; 20" has rifle sights | 12 ga.—7 lbs. 16 ga.—6¾ lbs. 20 ga.—6½ lbs. | Plain bbl. or vent. rib; cross-bolt safety; also in lft. hd. model; std., tournament, premier grades |
| 28"—20 ga., M, F 30"—12 ga., M, F | 12 ga.—8 lbs. 20 ga.—7 lbs. | Plain or vent. bbl.; also in lft. hd. model |

U.S. Shotguns: Slide Action (Cont.)

| Model | Gauge | Action |
|-----------------------------------------|-------------------------------------------------|---------------------------------------------|
| Remington 870R Deer Gun | 12, 20 | Same as std. 870 |
| Remington 870 SA Skeet | 12, 20 | Same as std. 870 |
| Remington 870 TB Trap | 12 | Same as std. 870 |
| Remington 870 Small-Gauge | 20, 28, .410; 20 ga. also avail. in 3" magazine | Same as std. 870 |
| Savage Model 30 Pump Gun. 30D Deluxe | 12, 20, .410—2¾" and 3" | Slide, hammerless, take-down, side ejection |
| Savage Model 30T Trap Gun | 12 ga. only; 2¾" and 3" | Same as std. 30 |
| Savage Model 30 Slug Gun | 20, 12 | |
| Smith & Wesson Model 916 Eastfield Pump | 12, 16, 20; 12, 20—3", 16—2¾" | |
| Weatherby Patrician Pump | 12—2¾" | Short stroke action |
| Western Field 550 Pump Shotgun | 12, 16, 20, .410; 12 ga. magazine also avail. | Slide action, takedown; straight-line feed |

| Barrel and Choke | Weight | Features |
|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------------------------------------------------------------------------------------|
| 20"—IC for rifled slugs | 6½ lbs. | Adj. rear, ramp front sights |
| 26"—Skt. choke or Cutts Comp. | 12 ga.—7 lbs. 20 ga.—6½ lbs. | Vent. rib; ivory bead front and white metal rear sight |
| 30"—M, F | 8 lbs. | Ivory front, white metal beads; recoil pad; also avail. in Monte Carlo stock or lft. hd. model |
| 25"—IC, M, F in 28 and .410 ga. 26"—20 ga., IC 28"—20 ga., M, F | 20 ga. mag.— 5¾ lbs. | Plain or vent. rib |
| 26"—12, 20 ga.—IC — .410, F 28"—12, 20 ga., M, F 30"—12 ga., F | 7-7¾ lbs. .410—6¼ lbs. | Top tang safety; field grade or deluxe model (vent. rib, recoil pad, engraving) |
| 30"—F | 8 lbs. | Monte Carlo stock; also in lft. hd. model |
| 22"—cyl. bore for rifled slugs | | Rifle sights |
| 20"—12 ga., C 26"—IC 28"—M, F, adj. 20"—F, 12 ga. only | 7¼ lbs. 12 ga. with 28" bbl. | Plain bbl. or vent. rib; recoil pad avail.; top tang safety |
| 26"—M, IC, skt. 28"—F, M 30"—F | About 7½ lbs. | Field or skeet grade; cross-bolt safety; interchangeable bbl. |
| 26"—.410, F 28"—20 ga., F, M —12 ga., M 30"—12 ga., F —12 ga. magazine, F 12, 16, 20 ga.—adj. choke 24"—slug gun, C | 8½ lbs. | Top tang safety; interchangeable bbls.; plain or vent. rib; fixed or variable choke |

U.S. Shotguns: Slide Action (Cont.)

| Model | Gauge | Action |
|------------------------------------|-------------------------------------------------------------------------|------------------------|
| Winchester 12 Slide Action Shotgun | 12 | |
| Winchester 1200 Pump Gun | 12, 16, 20; 12, 20 ga. also comes in 3" magazine with 28" and 30" bbls. | Slide action, takedown |
| Winchester 1200 Deer Gun | 12 | Same as std. 1200 |
| Winchester 1200 Riot Gun | 12, 16, 20 w/o sights; 12, sights | |
| Winchester 1200 Trap Gun | 12 | |

U.S. Shotguns: Double Barrel

| Model | Gauge | Action |
|------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Browning B-SS Side-by-Side Shotgun | 12, 20 20 ga.—2¾" and 3" loads | Top lever, break-open action, single trigger fires rt. front bbl. first; auto. ejectors of fired shells; unfired shells elevated for removal |

| Barrel and Choke | Weight | Features |
|-----------------------------------------------------------------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------|
| 26"—IC, skt. in field grade and skt. model | Field and skt., 7¾ lbs. | 4 models: Field, skt., std. trap, and trap with Monte Carlo; all models with vent. rib |
| 28"—M, field grade | Std. and Monte Carlo trap, 8¼ lbs. | |
| 30"—F, field model and trap model | | |
| 26"—IC and Winchoke | 12 ga.—6½ lbs. | Cross bolt safety; metal bead front sight; plain or vent. rib |
| 28"—M, F and Winchoke | | |
| 30"—F (12 ga. only) | | |
| Winchoke models (12, 20 ga.) have 3 choices of choke tubes: IC, M, F; each can be screwed into bbl. | | |
| 22" bbl.; bored for rifled slugs | | Rifle-type sights; rear adj. for e only |
| 22" bbl. | | |
| 30"—F | | Vent. rib; metal middle, red front sights; Monte Carlo stock extra |

| Barrel and Choke | Weight | Features |
|--------------------|--------------------------|-------------------------------------------------------------------------------------|
| 26"—M, F, or IC, M | 12 ga.—26" bbl. | Top tang safety, goes on automatically when breech opened; nickel sliver sight bead |
| 28"—M, F | —7 lbs. 3 oz. | |
| | 28"—7 lbs. 5 oz. | |
| | 20 ga.—26"—6 lbs. 14 oz. | |
| | 28"—7 lbs. | |

U.S. Shotguns: Double Barrel (Cont.)

| Model | Gauge | Action |
|------------------------------------------------------------------------|------------------------------------|--------------------------------------------------------------------------------------------------|
| Ithaca SKB 100, 150, and 200E Double | 12 ga.—2¾" 20 ga.—3" | Top lever, hammerless, boxlock, nonautomatic ejector |
| Ithaca SKB 280 Eng- lish Double | 12, 20 | Auto-selective ejectors |
| Ithaca SKB 280 Quail Double | 20 ga.—3" | Auto-selective ejectors, single triggers |
| Marlin LC Smith Double | 12 | Sidelock double, double triggers, extractors raise shells for withdrawal |
| Pedersen 2000 Double (Grade I or II) and 2500 Double (Grade III) | 12, 20 | Boxlock; auto.-selective ejectors; barrel selec- tor/safety; single selec- tive trigger |
| Savage/Fox Model B-SE Double | 12, 20, .410 20 ga.—3"; .410—3" | Auto. ejectors, single trigger |
| Savage 550 Double | 12, 20 | Like B-SE except more engraving, etc. |

| Barrel and Choke | Weight | Features |
|-------------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 25"—20 ga.—M, IC, skt. | 20 ga.—6–6¼ lbs. | Automatic safety; models 150, 200E have checkering, engraving; 200E has auto.-selective ejectors and bead middle sight |
| 26"—12 ga.—M, IC, skt. | 12 ga.—7–7¼ lbs. | |
| 28"—12, 20 ga.—F, M | | |
| 30"—12 ga.—F, M | | |
| 25"—20 ga.—M, IC | 12 ga.—7½ lbs. | Straight-grip stock |
| 26"—12 ga.—F, M | 20 ga.—6½ lbs. | |
| 28"—12, 20 ga.—F, M | | |
| 25"—IC and IC | 6½ lbs. | Straight stock |
| 28"—M, F | 6¾ lbs. | Field and deluxe grades with vent. rib |
| | | Auto. safety. Grade I—Weight and stock made to customer specs Grade II—Std. stock with not as much engraving, etc. Grade III—Field grade |
| 26"—12, 20 ga.—M and IC | 12 ga.—7 lbs. | Vent. rib; white bead front and middle sights |
| — .410—F and F | 16 ga.—6¾ lbs. | |
| 28"—12, 20 ga.—F and M | 20 ga.—6½ lbs. | |
| 30"—12 ga.—F and M | .410 ga.—6¼ lbs. | |

Like B-SE except more engraving, etc.

U.S. Shotguns: Double Barrel (Cont.)

| Model | Gauge | Action |
|----------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------|
| Savage/Fox Model B | 12, 20, .410 Cham- bered for 2¾" and 3"; .410—2½" and 3" | Hammerless, top lever, double triggers |
| Savage-Stevens Model 311 Double | 12, 16, 20, .410. All except 16 cham- bered for 3" | Top lever, ham- merless; double triggers |
| Universal Double-Wing Double | 12, 20, .410 ga.—3" 10 ga.—3½" | Top break, box- lock; double trig- gers |
| Winchester Model 21 Double-Barrel Shotgun | 12, 16, 20 3" chamber avail. in 12, 20 ga. In Pigeon and Grand American | Automatic or nonauto. safety |

| Barrel and Choke | Weight | Features |
|-------------------------------------------------------------------------------------------------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 24"—12, 20 ga.—IC and M 26"—12, 20 ga.—IC and M —,410 ga.—F and F 28"—12, 20 ga.—M and F 30"—12 ga.—M and F | 7-8 lbs. | |
| 26"—12, 20—IC, and M —,410—F and F 28"—12, 16, 20—M and F 30"—12—F and F | 7-8 lbs. | Auto. top tang safety |
| 26"—IC, M 28", 30"—M and F, IC and M, F and F 32"—10 ga., F and F | About 7 lbs. | Recoil pad |
| 26"—12, 16, 20 ga. 28"—12, 16, 20 ga. 30"—12, 16, 20 ga. 32"—12 ga. Choice of choke combination | | 3 grades: Custom, Pigeon, and Grand American; stock built to customer specs; straight or pistol grip; Monte Carlo and/or offset; field, skt., or trap forend; choice of butt; choice of front and middle sights; Pigeon and Grand American has matted or vent. rib plus much fold engraving; Grand American with interchangeable bbls. |

U.S. Shotgun: Over-Under

| Model | Gauge | Action |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Browning "Liege" Over-Under | 12 only 2¾" or 3" mag. | Single trigger; auto-ejectors: fired shells thrown out, unfired elevated |
| Browning Superposed Standard & Lightning Models | 12, 20, 28, .410 20 ga. bbl. also avail. for 12 ga.; 28 ga. and .410 bbls. avail. for 20 ga.; .410 bbl. avail. for 28 ga. | Auto-ejectors; unfired shells elevated; take-down; single selective trigger; boxlock, top lever |
| Browning Superposed Super-Light | 12, 20 | Same as lightning |
| Browning Superposed Magnum 12 | 12 ga.—3" mag. | Same as lightning |
| Browning Superposed Lightning Trap 12 and Broadway Trap 12 | 12 | Same as lightning |
| Ithaca Mirage Over- Under | 12 ga.—2¾" | Boxlock, single selective trigger (firing order may be specified); interchangeable hammer-trigger |
| Ithaca MX-8 Trap Gun | 12 ga. only, 2¾" | Boxlock, single non-selective trigger; interchangeable trigger hammer group offers firing order choice |

| Barrel and Choke | Weight | Features |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26½" and 28" (2¾")— F and F, M and F, IC and M 28"—3" mag.—M and F 30"—3" mag.—F and F, M and F | 7¼–7¾ lbs. | Manual safety combined with barrel selector |
| 26½" or 28" bbls. On all models any combina- tion of F, IM, M, IC, skt. or cyl. | 20 ga.—6–6¼ lbs. 12 ga.—7–7¼ lbs. 28 ga.—6½–6¾ lbs. .410 ga.—6½– 6¾ lbs. | Manual safety off bbl. selector button; Grades I, Pigeon, Dana, and Midas; Lightning models average 4–7 oz. less in weight than std. models; vent. rib on all models |
| 26½"—any choke combination | 12 ga.—6½ lbs. 20 ga.—6 lbs. | Same as Lightning; all 4 grades avail. |
| 28" or 30" bbls.—any choke combinations | About 8 lbs. | Same as Lightning; all 4 grades avail.; recoil pad |
| 30" bbl.—Lightning Trap 12, F and F, F and IM, F and M 30", 32" bbl.—Broadway Trap 12, F and F, F and IM, F and M | 30" bbl.—7¾ lbs. 32" bbl.—8 lbs. | All 4 grades avail.; trap stock dimensions; light- ning has semibeavertail forend and ivory sights; Broadway has ⅝" wide vent |
| 28", 30", 32"—skt. and skt., or extra-full and M | 8½ lbs. | Vent. rib; recoil pad |
| 30" or 32", special bore for trap | About 8 lbs. | Vent. middle rib, vent. ports; 9 stocks avail. in- cluding Monte Carlo |

U.S. Shotgun: Over-Under (Cont.)

| Model | Gauge | Action |
|-----------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------|
| Ithaca SKB 500 Over-Under Shotgun | 12 ga.—2¾" 20 ga.—3" 12 ga. also in 3" magazine | Automatic selective ejectors; selective single-trigger boxlock type |
| Ithaca SKB 600. Field, Skeet, or Trap Over-Under Shotguns | 12 ga.—2¾" 20 ga.—3" Also in 28 ga. and .410 (skt. and skt.) | Same as 500 |
| Ithaca SKB 700. Trap or Skeet Over-Under Shotgun | Trap—12 ga., 2¾" Skeet—12, 20 ga.; 20 ga. 3" | Same as 500 |
| Ithaca Competition I Trap Over-Under or Skeet Over-Under | 12 ga. only, 2¾" | Same as mirage |
| Ithaca Light Game Model | 12 ga.—2¾" | Same as mirage |
| Ithaca SKB 680 English Over-Under | 12, 20 | Boxlock, auto-selective ejector; single selective trigger |

| Barrel and Choke | Weight | Features |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| 26"—12, 20 ga.—M and IC 28"—12, 20 ga.—F and M 30"—12 ga.—F and M | 12 ga.—7½ lbs. 20 ga.—6½ lbs. | Vent. rib; nonauto. safety; Ithaca Raybar front sight |
| 26"—12, 20 ga.—field model, M and IC 26"—12, 20 ga.—skt. model, skt. and skt. 28"—12, 20 ga.—field model, F and M 28"—12, 20, 28, .410—skt. model, skt. and skt. 30"—12 ga.—field model, F and M 30"—12 ga.—trap model, F and F, or IM and F | 12 ga.—field and skt. mdl., 7½ lbs. 12 ga.—Trap, 7¾ lbs. 20 ga.—field and skt., 6½ lbs. | Nonauto. safety; trap model has Monte Carlo stock, bead middle sight; all have vent. rib; trap and skt. models have recoil pad |
| 26", 28"—12, 20 ga., skt. and skt. 30"—12 ga., trap, F and F | 20 ga.—6½ lbs. 12 ga. skt.—7½ lbs. 12 ga. trap—7¾ lbs. | Deluxe version of model 600 |
| 30" or 32"—trap, F and IM 26¾"—skt., skt. and skt. | About 7¾ lbs. | 6 Std. and 3 Monte Carlo stocks; tapered forend |
| 27⅝"—M and F, IC and F, IC and M | 6¾ lbs. | Vent. rib |
| 26" or 28"—F and M, M and IC | 7 lbs. | Bradley-type sights on target grades |

U.S. Shotgun: Over-Under (Cont.)

| Model | Gauge | Action |
|------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------|
| Ithaca SKB 880 Crown Grade Over-Under | 12, 20 | Boxlock |
| Pedersen 1000 Series | 12, 20 | Boxlock; auto-ejectors; single selective trigger |
| Pedersen 1500 Over- Under | 12 ga. field, trap, and skeet models | Boxlock; automatic selective ejectors |
| Remington 3200 Over- Under | 12 ga.—2¾" | Auto-ejectors; unfired shells elevated for ex- traction; single selective trigger |
| Remington 3200 Over- Under Trap | 12 ga.—2¾" | Same as field model |

| Barrel and Choke | Weight | Features |
|---------------------------------------------------------------------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Trap—30", 32"—F and IM Skeet—26"—skt. and skt. 20 ga.—skt. 28"—skt. and skt. | Skeet—7 lbs. Trap—8 lbs. | Bradley-type sights |
| To customer specs | To customer specs | Custom (Grade I), Grade II and Grade III. Recoil pad, vent. rib; stock to customer specs; also avail. trap or skeet models. Grade II—like I except std. stock, less en- graving, etc. Grade III— like I except std. stock, less engraving, etc. |
| 26" to 32"; skeet has skeet chokes | 7-7½ lbs. | Recoil pad; field fun ver- sion of 1000 series; choice of sights on target gun; field model has Ray- bar sight; trap has Monte Carlo stock |
| 26"—IC and M —skt. and skt. 28"—M and F —skt. and skt. 30"—M and F | With 26" bbl.— 7¾ lbs. | Top tang manual safety and barrel selector; metal front sight on field models; ivory bead front and metal rear on skt. models; vent. rib |
| 30"—F and F —IM and F | 8¼ lbs. | Comes in model with or without Monte Carlo stock; "special" trap model has select walnut stock; beavertail forend |

U.S. Shotgun: Over-Under (Cont.)

| Model | Gauge | Action |
|-----------------------------------------|------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Savage 333 Over-Under | 12, 20 ga. 20 ga. has 2¾" and 3" changer | Top lever break down; single selective trigger; auto ejectors |
| Savage 333T Over-Under | 12 | Same as 333 |
| Savage 330 Over-Under | 12, 20 20 ga.—3" | Top lever, break open; selective single trigger; positive extraction as gun opens |
| Universal Over Sing Over-Under | 12, 20—3" | Top lever, hammerless, boxlock, double triggers |
| Weatherby Regency Over-Under Shotgun | 12 ga.—2¾" 20 ga.—3" | Boxlock, top lever, break open action; selective auto ejectors, single selective trigger |
| Winchester 101 Magnum Over-Under | 12, 20 ga.—3" or 2¾" shells | Top lever, break open; single selective trigger, auto ejector |
| Winchester 101 Trap Over-Under | 12 ga.—2¾" | Same as above |

| Barrel and Choke | Weight | Features |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| 26"—IC and M —skt. and skt. 28"—M and F 30"—M and F | 6¼–7¼ lbs. | Auto safety; cocking indicators; two bead sights |
| 30"—IM and F | 7¾ lbs. | Wide vent. rib, manual top tang safety; recoil pad; Monte Carlo stock |
| 26"—IC and M 28"—M and F 30"—12 ga.—M and F Interchangeable bbls. 12 or 20 ga. can be used with one gun | 30"—7 lbs. | Auto top tang safety locks trigger. Coil springs. Front bead |
| 26"—IC and M 28", 30"—M and F | 12 ga.—7½ lbs. 20 ga.—6½ lbs. | Front and middle sights; single trigger extra |
| 26"—12, 20 ga.—skt. and skt. or M and IC —20 ga.—F and M 28"—12, 20 ga.—skt. and skt., M and IC, F and M 30"—12 ga. only— F and M 30", 32"—12 ga. trap, F and F, F and IM, F and M | 12 ga.—7¾–7⅞ lbs. 20 ga.—6⅞– 6⅞ lbs. 12 ga. trap—7¾– 8 lbs. | Mechanically operated trigger; top tang safety; Greener cross-bolt; recoil pad; also comes in trap model |
| 30"—12 ga.—M and F, F and F —20 ga.—F and F | 12 ga.—7¾ lbs. 20 ga.—6½ lbs. | Same as 101 |
| 30"—F and F 30" or 32"—Monte Carlo—F and F, IM and F | 30"—8 lbs. 32"—8¼ lbs. | With or without Monte Carlo stock; recoil pad; metal front and bead sights |

U.S. Shotguns: Over-Under (Cont.)

| Model | Gauge | Action |
|---------------------------|--------------------------------------------------|---------------------------------------------------------------|
| Winchester 101 Over-Under | 12 ga.—2¾" 20 ga.—3" 28 ga.—2¾" .410—3" | Top lever, break open; single selective trigger, auto ejector |

U.S. Shotguns: Bolt Action

| Model | Gauge | Action |
|------------------------------------------------|-------------------------------|-------------------------------------|
| Marlin Goose Gun, Bolt-Action | 12 ga. magazine 2¾" and 3" | Bolt; thumb safety; detachable clip |
| Marlin Glenfield 50 Bolt-Action | 12, 20 ga. magazine | |
| Marlin 55S Slug Gun Bolt-Action | 12 ga. magazine 2¾" and 3" | Same as goose gun |
| Mossberg 183K .410 Bolt-Action | .410—3" | Top-loading magazine |
| Mossberg 395K—12 ga.; 390K—16 ga.; 385K—20 ga. | 12, 16, 20 ga.—3" | Bolt; takedown; detachable clip |
| Mossberg 395S Bolt-Action | 12 ga.—3" | |

| Barrel and Choke | Weight | Features |
|-------------------------------------------------------------|-------------------|---------------------------------------------------------------------|
| 26"—12 ga.—IC and M, skt. and skt. | 12 ga.—7¼—7¾ lbs. | Manual safety with bbl. selector at top of receiver tang; vent. rib |
| 26½"—20, 28 ga.—IC and M, skt. and skt. | 20 ga.—6½ lbs. | |
| .410—IC and M | 28 ga.—6¼—6¾ lbs. | |
| 28"—12 ga.—M and F —20, 28, .410 ga.—M and F, skt. and skt. | .410—6¼—6¾ lbs. | |
| 30"—12 ga.—M and F | | |

| Barrel and Choke | Weight | Features |
|------------------------------|--------------------------------------|----------------------------------------------------------------------------------|
| 36"—Full | 7¼ lbs. | Double extractors, tapped for receiver sights; comes with bead front sight |
| 28"—12 ga.—F 26"—20 ga.—F | 28"—7 lbs. | Same as goose gun |
| 24"—bored for rifled slug | 7 lbs. | Same as goose gun exc. tapped for scope; comes with iron sights; adj. rear sight |
| 25"—with C-Lect adj. choke | 6¾ lbs. | Thumb safety; gold bead front sight |
| 28"—with C-Lect adj. choke | 12, 16 ga.—6¾ lbs. 20 ga.—6¼ lbs. | Top safety, grooved rear sight; Monte Carlo comb, recoil pad |
| 24"—bored for rifled slug | | Patridge-type front sight; adj. folding leaf rear sight |

U.S. Shotguns: Bolt Action (Cont.)

| Model | Gauge | Action |
|---------------------------------------|------------------------------------------------|--------------------------------------------------------|
| Savage-Stevens 58 Bolt-Action Shotgun | 12, 20 ga. 20 ga.—2¾" and 3" .410 ga.—3" | Self-cocking bolt; double extractors |
| Savage-Stevens 59 .410 Bolt-Action | .410 ga.—3" | Clip magazine |
| Western Field 150 Bolt-Action Shotgun | .410 ga.—3" | Self-cocking bolt action; top loading, 3-shot magazine |
| Western Field 172 Bolt-Action Shotgun | 12 ga.—3" | Self-cocking bolt; double lugs, detachable clip |
| Western Field 170 Slug Gun | 12 ga.—3" | Self-cocking bolt action; take-down, detachable clip |

U.S. Shotguns: Single Shot

| Model | Gauge | Action |
|---------------------------------|----------------------------------------|--------------------------------------------------------------------------|
| Browning BT-99 Single Bbl. Trap | 12 ga. only; 2¾" | Top lever, break-open, hammerless; auto. ejector, unfired shell elevated |
| Clerke Falling Block Shotgun | 12, 20, .410 ga. 2¾" or 3" magazine | Exposed rebounding hammer, falling block side lever action |
| Garcia Bronco 410 Shotgun | .410—3" | Swing-out chamber |

| Barrel and Choke | Weight | Features |
|--------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------|
| 25"—12, 20 ga.—F 24"—.410—F | 7-7½ lbs. .410—5½ lbs. | Thumb safety, recoil pad |
| 24" | 6 lbs. | Same as 58 .410 exc. clip magazine holds 5 3" or 6 2½" shells |
| 24"—Full | 5½ lbs. | Monte Carlo stock; thumb safety |
| 28"—Adj. choke | | Thumb safety; Monte Carlo stock; recoil pad; grooved rear sight; regu- lar shells and rifled slugs |
| 24"—bored for rifled slugs | 6¾ lbs. | Thumb safety; double locking lugs; rifle sights; recoil pad |

| Barrel and Choke | Weight | Features |
|---------------------|---------------------------|----------------------------------------------------------------------------|
| 32" or 34"—M, IM, F | 32"—8 lbs. 34"—8½ lbs. | Vent. rib; no safety; ivory front and center sight beads; recoil pad |
| | 12 ga.—6¼ lbs. | Vent. rib; recoil pad |
| | 3½ lbs. | Push-button safety |

U.S. Shotguns: Single Shot (Cont.)

| Model | Gauge | Action |
|------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------|
| H & R Harrick No. I | 12 ga. only; 2¾" | Anson & Deeley type locking system |
| H & R Topper Series Model 158 | 12, 20, .410—3" 16 ga.—2¾" | Takedown, side lever opening; auto. rebound; external hammer, auto ejector; push-button action release |
| H & R Topper Model 490 Junior Model | 20, .410—3" | " |
| Model 198 | 20, .410—3" | " |
| Model 162 Topper Buck | 12—3" | " |
| Ithaca 66 Supersingle Single Shot Lever Action | 12, 20, .410—3" | Nontakedown, under lever opening |
| Ithaca 66 Supersingle Youth | 20, .410 | Same as std. model |
| Ithaca 66 RS Buck- buster | 12, 20—3" | Same as std. model |
| Ithaca Single Barrel Trap Shotgun 4E Grade | 12 ga. only—2¾" | Top lever, break open, hammerless, dual locking lugs |
| 5E Grade | Same as 4E above. | Same as 4E above. |

| Barrel and Choke | Weight | Features |
|------------------------------------------------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------|
| 32" or 34"—Full | 8½ lbs. | Vent. rib; Monte Carlo stock; beavertail forend; for trap shooting |
| 28"—20 ga.—F, M —16 ga.—M —.410—F 30, 32, 36"—12 ga.— Full | 5½–6 lbs. | Recoil pad; self-adj. bbl. lock; coil spring throughout; adj. Lyman peep rear sight, dovetail front sight; cross-bolt safety |
| 26"—20 ga.—M .410—F | 5 lbs. | " |
| 28"—20 ga.—M .410—F | 5¼ lbs. | " |
| 24"—cyl. bore for rifled slugs | 5½ lbs. | " |
| 26"—.410—F 28"—12, 20 ga.—M, F 30"—12 ga.—F 36"—12 ga.—F | About 7 lbs. | Rebounding hammer-type safety independent of lever; vent. rib on 20 ga. only |
| 26"—Full | | Shorter stock with recoil pad; 20 ga. also avail. with vent. rib |
| 22" bbl.—bored for rifled slugs | | Rifle sights, recoil pad |
| 30" or 32" | | Recoil pad; Monte Carlo comb |
| | | Vent. rib; better wood; more engraving; gold inlaid; custom made stock |

U.S. Shotguns: Single Shot (Cont.)

| Model | Gauge | Action |
|---------------------------------------|-------------------------------|------------------------------------------------------|
| 4500 Grade Ejector | Same as 5E Grade. | Same as 5E Grade. |
| Ithaca Perazzi Single Barrel Trap | 12 ga.—2¾" | Top lever, break open |
| Ithaca SKB Century Single Barrel Trap | 12 ga.—2¾" | Auto.-ejector |
| Iver Johnson Companion | 12, 20, .410—3" | Takedown, auto.-ejection |
| Savage-Stevens Model 94-C Single | 12, 20, .410—3" 16 ga.—2¾" | Top lever, break open; hammer; auto.-ejector |
| Savage-Stevens M 94 Youth Gun | 20, .410—3" | Same as 94-C |
| Western Field 100 Single Barrel Gun | 12, 16, 20, .410 .410—3" | Hammerless, thumb slide, break open, auto. ejector |
| Western Field 100 Youth Model | 20, .410 | Same as std. |
| Winchester 37A Single Shot | 12, 20, .410—3" 16, 28—2¾" | Top lever, break open, exposed hammer, auto. ejector |

| Barrel and Choke | Weight | Features |
|-----------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------|
| | | Special wood, better engraving, figures inlaid in green and yellow gold, platinum; gold-plated trigger |
| 32" or 34"—custom choking | About 8½ lbs. | Top tang safety; vent. rib; custom stock |
| 32" or 34"—F | 8 lbs. | Bradley-type front, middle bead; Monte Carlo or straight stock; vent. rib |
| 26"—.410—F 28"—12, 20 ga.—F 30"—12 ga.—F | | Trap-style forend |
| 26"—.410—F 28"—12, 16, 20 ga.—F 30", 32", 36"—12 ga.—F | About 6 lbs. | Low rebounding hammer |
| 26"—20 ga.—M — .410—F | 5½ lbs. | 12½" stock with recoil pad |
| 26"—.410—F 28"—16, 20 ga.—F 30"—12 ga. | 6¼–7 lbs. | Automatic safety |
| 26"—20, .410 | 6 lbs. | Youth model stock |
| 26"—.410—F 28"—20, 28 ga.—F 30"—16 ga.—F 30", 32", 36"—12 ga.—F. Also youth model in 20 ga.—26"—IM or .410—F | 5½–6¼ lbs. | Metal bead front sight; concave hammer spur; youth model has 12½" pull |

Imported Shotguns: Autoloading

| Model | Gauge | Action |
|-------------------------------|----------------------------------|----------------------------------------------|
| Beretta AL-2 Auto Shotgun | 12, 20 ga. 12 ga.—3" magazine | Gas operated |
| Charles Daly Auto Shotgun | 12 ga.—2¾" | Recoil operated |
| Franchi Std. Auto Shotgun | 12, 20, 28 | Recoil operated |
| Franchi Std. Slug Gun | 12, 20 | Recoil operated |
| Franchi Magnum Auto Shotgun | 12, 20 ga.—3" magazine | Recoil operated; take-down |
| Franchi Custom Auto | 12, 20 | Same as std. auto., but custom made to specs |
| Tradewinds H-170 Auto Shotgun | 12 ga. only—2¾" | Recoil operated |

| Barrel and Choke | Weight | Features |
|--------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26"—12, 20 ga.—IC, skt. | 20 ga.—6½ lbs. 12 ga.—7-7½ lbs. | Interchangeable bbls., vent.rib, cross-bolt safety; trap model has recoil pad, Monte Carlo stock; imported from Italy by Garcia |
| 28"—12, 20 ga.—F, M —12 ga. magazine —M | 12 ga. trap— 7½ lbs. 12 ga. mag.— | |
| 30"—12 ga.—F —12 ga. trap—F —12 ga. magazine —F | 7¾ lbs. | |
| 26"—IC 28"—M, F 30"—F | | Vent. rib, button safety; imported by Charles Daly |
| 24"—12, 20 ga.—C 26"—12, 20 ga.—IC —28 ga.—M 28"—12, 20 ga.—M, F —28 ga.—F 30"—12 ga.—F | 12 ga.—6¼ lbs. 20, 28 ga.—5½ lbs. | Plain bbl. or vent. rib; comes also in hunter model—furnished only with vent. rib, engraved receiver in 12, 20 ga. Eldorado model also avail. with elaborate engraving, gold-plated trig. |
| 22"—cyl. bored for rifled slugs | | Adj. folding leaf open rear sight, gold-bead front |
| 28"—20 ga.—F 32"—12 ga.—F | 12 ga.—8¼ lbs. 20 ga.—6 lbs. | Vent. rib; also comes in Wildfowler models with elaborate engraving |
| Same as std. auto., but custom made to specs | | Comes in 3 grades: Crown, Diamond, Imperial |
| 26", 28"—M 28"—F | 7 lbs. | Vent. rib; imported by Tradewinds |

Imported Shotguns: Double Barrel

| Model | Gauge | Action |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Atlas Model 208 Double Barrel Shotgun | 12, 20, 28, .410—all 3" | Anson & Deeley type |
| Atlas 145 Double Bbl. Shotgun | 12, 20 ga.—2¾" | Anson & Deeley type |
| Atlas 500 Magnum Double Bbl. Shotgun | 10 ga.—3½" 12, 20 ga.—3" | Anson & Deeley box-lock; double trigger |
| Atlas Model 520 Hammer Double Shotgun | 12 ga.—3" | Greener crossbolt external hammer |
| Aya Models 56, 53E, No. 1, No. 2, XXV/SL, 117 Double Bbl. Shotgun | 12, 22 ga.—2¾" or 3" (on request) XXV/SL—12 ga.—2¾" only. No. 1, 2—12 ga.—2¾" only | Model 56—heavy competition sidelock frame, triple bolting 53E—hand detachable locks. No. 1, 2—Ltw. frame, double bolting |
| Beretta GR Double Barrel Shotgun | 12 ga.—2¾" 20 ga.—3" 12 ga.—3" mag. (in GR-3 only) | Improved Greener action GR-2—double triggers. GR-3—single selective trig. GR-4—single selective trigger, selective auto-ejectors |

| Barrel and Choke | Weight | Features |
|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26"—IC and M —M and F 28"—M and F | 6-7 lbs. | Double trigger; imported from Italy by Atlas Arms |
| 26"—skt. and skt. 28"—M and F | 6-7 lbs. | Vent. rib.; choice of p.g. or straight stock; hand engraving; imported from Italy by Atlas Arms |
| 28"—M and F 32"—F and F | 8 lbs. | Vent. rib.; recoil pad; imported from Italy by Atlas Arms |
| 18½"—C and C | 6 lbs. | Engraved. Imported from Italy by Atlas Arms |
| Up to 30"; made to customer specs. XXV/SL—narrow top rib, 25" bbl. 56—Matted rib. 53E, 117, No. 1, 2—concave rib | | Stock made to customer specs; auto safety and ejectors, gas escape valves, engraved frame. 56, XXV/SL, No. 1—loading indicators. No. 2, 117—no loading indicators. 56, 53E, No. 1, XXV/SL, 117—folding front trigger. No. 2—no folding front trigger. Imported from Spain by JBL Arms |
| 26"—12, 20 ga.—IC and M 28"—12, 20 ga.—M and F 30"—12, 20 ga. mag.—M and F | 12 ga.—7-7¼ lbs. 12 ga. magazine—8 lbs. 20 ga.—6½ lbs. | Vent. rib. GR-3—Recoil pad. GR-4—engraved. Imported from Italy by Garcia |

Imported Shotguns: Double Barrel (Cont.)

| Model | Gauge | Action |
|-------------------------------------------------|---------------------------------------------|-----------------------------------------------------------|
| Beretta SO Double Barrel Shotgun | 12 ga.—2¾" | Heavy underlug locking; single selective or dble. trigger |
| Bernardelli Game Cock Double Shotgun | 12 ga.—2¾" 20 ga.—3" | Hammerless, boxlock, auto safety |
| Bernardelli Italia Pigeon Hammer Dble. Shotgun | 12 ga.—2¾" | Greener-type crossbolt; dble. triggers, hammer type |
| Bernardelli Brescia Hammer Dble. Barrel Shotgun | 12, 20 ga.—2¾" | Hammer type; Greener-type locks, crossbolt |
| Brescia Double Bbl. Shotgun | 12, 20 ga.—2¾" | Anson & Deeley dble. triggers |
| Century Folding Dble. Barrel | .410—3" | Hammer, side lever to open |
| Charles Daly P-O-S Double Bbl. Shotgun | 10 ga.—3½" 12, 20, .410—3" 28 ga.—2¾" | Hammerless, dble. triggers |

| Barrel and Choke | Weight | Features |
|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26"—IC and M 28"—M and F 30"—diff. bbl. and choke combinations made to order | 7-7¼ lbs. | Made to order on cus- tomer specs. Auto safety on fld. models, manual on skt. and trap. SO-6 and SO-7. SO-7 has more ornamentation. Imported from Italy by Garcia |
| 25"—12, 20 ga.—IC and M 28"—12, 20 ga.—M and F | 12 ga.—6⅞ lbs. 20 ga.—5½-5⅝ lbs. | Std.-Dble. triggers. Deluxe—auto ejectors, light engraving Premier—auto ejectors, nonselective single trig- ger, engraving. Imported from Italy by Stoeger Arms |
| 28"—M and F 30"—M and F | | Half-cock safety. Imported from Italy by Stoeger Arms |
| 28"—12 ga.—M and F 30"—12 ga.—M and F 25"—20 ga.—IC and M | | Imported from Italy by Stoeger Arms |
| 28"—F and M —IC and M | 6½ lbs. | Recoil pad; engraved. Imported from Italy by Kleingunther |
| 27¾"—F and F | 4¾ lbs. | Button on frame depresses to fold gun. Imported from Spain by Century Arms |
| 26"—12, 20 ga.—IC and M 28 ga., .410—M and F 28"—12, 20 ga.—M and F 30"—12 ga.—M and F, F and F 32"—12 ga.—F and F | | Imported from Spain by Charles Daly |

Imported Shotguns: Double Barrel (Cont.)

| Model | Gauge | Action |
|-----------------------------------------|--------------------------------|----------------------------------------------------------------|
| Darne Sliding Breech Double | 12, 16, 20, 28 | Sliding breech, dble. triggers, selective ejectors |
| Davidson Model 63B Double Bbl. Shotgun | 12, 16, 20, 28 ga.—2¾" .410—3" | Anson & Deeley with crossbolt on 12, 20 ga.; manual extractors |
| Davidson 63B Magnum Double Bbl. Shotgun | 10 ga.—3½" 12, 20 ga.—3" mag. | Manual extractors |
| Dixie Hammer Double Bbl. Shotgun | 12, 28 ga.—2¾" | Front and back action |
| F.I.E. Double Barrel Shotgun | 12, 20, .410 | Boxlock; double triggers |
| Falcon Goose Double Bbl. Shotgun | 10 ga.—3½" | Anson & Deeley with Holland type extractors; double triggers |

| Barrel and Choke | Weight | Features |
|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| 25½"—27½"—choice of checkering | 5½–6½ lbs. | Plume or raised rib; avail. in 8 grades; stock or custom made. Imported from France by Firearms Center, Inc. |
| 25"—.410—F and F 26"—12, 16, 20, 28 ga.—IC and M 28"—12, 16, 20, 28 ga.—M and F 30"—12 ga.—M and F | 12 ga.—7 lbs. 16, 20, 28 ga.—6½ lbs. .410 ga.—5 lbs. 11 oz. | Auto. safety. Imported from Europe by Davidson |
| 28"—12, 20 ga.—M and F 30"—12 ga.—M and F 32"—10 ga.—F and F | 10 ga.—10⅝ lbs. 12 ga.—7½ lbs. 20 ga.—6¾ lbs. | Auto. safety; recoil pad. Imported from Europe by Davidson |
| 28"—32" bbl. | Varies | Choice of stock; some engraving. Imported from Belgium by Dixie Gun Works |
| 26"—12, 20 ga.—IC and M — .410—M and F, F and F 28"—12, 20 ga.—M and F 30"—12 ga.—F and F | | Raised matted rib; engraved. Imported by Firearms Import & Export |
| 32"—F and F | 11 lbs. | Rubber recoil pad; auto safety; engraved. Imported from Spain by American Import |

Imported Shotguns: Double Barrel (Cont.)

| Model | Gauge | Action |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Loyola Magnum Dbl. Bbl. Shotgun | 10 ga.—3½" 12, 20, .410—3" | Hammerless; double trigger; auto. safety |
| Mauser Model 580 Dbl. Barrel Shotgun | 12, 20 ga.—3" | Side lock; Holland & Holland; auto. selective ejectors; choice of dbl. or single trig. |
| Mercury Mag. Double Bbl. Shotgun | 10 ga.—3½" 12, 20 ga.—3" | Triple-lock Anson & Deeley type; dble. triggers; front-hinged, auto. extractors |
| G. Merkel 475 Side by Side | 12, 16, 20 ga.—2¾" or 3" | Sidelock with double hook batting and Greener breech; dble, single, or single selective trigger |
| Premier Dble. Barrel Shotgun. Ambassador or Continental Models | 12, 16 ga.—2¾" 20, .410 ga.—3" (.410 not avail. in Continental) | Triple Greener cross-bolt; side locks; Purdey avail. on .410; double triggers; Continental has outside hammers |
| Premier Double-Barrel Shotgun. Regent, Brush King & Magnum Models | 12 ga.—2¾" or 3" magazine 10 ga.—3½" magazine 16, 28 ga.—2¾" 20, .410—3" Regent has 12, 20 ga. only; Magnum has 10, 12 ga. only | Triple Greener cross-bolt; Purdey optional on 28, .410; double triggers |

| Barrel and Choke | Weight | Features |
|-----------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 26"—12, 20 ga.—IC and M — .410 ga.—F and F | | Solid or vent. rib; rubber recoil pad. Imported from Spain by Jana |
| 28"—12, 20 ga.—F and M | | |
| 30"—10, 12 ga.—F and M —12 ga.—F and F | | |
| 32"—10 ga.—F and F | | |
| 28"—F and IM —IC and M | 7 lbs. | Engraved. Imported from Germany by Mauser Bauer |
| 28"—12, 20 ga.—F and M | 10 ga.—10 $\frac{1}{8}$ lbs. 12 ga.—7 $\frac{1}{4}$ lbs. | Auto. safety; safety gas ports; recoil pad. Imported from Spain by Tradewinds |
| 32"—10 ga.—F and F | 20 ga.—6 $\frac{1}{2}$ lbs. | |
| To customer specs | 6 $\frac{1}{4}$ –6 $\frac{3}{4}$ lbs. | Stock to customer specs; cocking indicators; engraving. Imported by Champlin Firearms |
| 22"—all gauges except .410—M and F | 12 ga.—7 $\frac{1}{4}$ lbs. .410—6 $\frac{1}{4}$ lbs. | Auto. safety; cocking indicators. Imported from Europe by Premier |
| 26"—all gauges—M and F | | |
| 22"—12, 20 ga.—Brush King, IC and M | 12 ga.—Brush King, 6 $\frac{1}{4}$ lbs. | Auto. safety; matted rib; Magnum has recoil pad. Imported from Europe by Premier |
| 26"—12, 16, 20 ga.—Regent, IC and M | —Regent, 7 $\frac{1}{4}$ lbs. 20 ga.—Brush King, 5 $\frac{3}{4}$ lbs. | |
| —28, .410 ga.—M and F | .410—6 $\frac{1}{8}$ lbs. | |
| 28"—all gauges—M and F | | |
| 30"—12 ga.—M and F —12 ga. Magnum F and F | | |
| 32"—10 ga.—F and F | | |

Imported Shotguns: Double Barrel (Cont.)

| Model | Gauge | Action |
|-----------------------------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------|
| Rossi Overland Double-Barrel Shotgun | 12, 20, .410 ga.—3" | Sidelock, external hammers, Greener cross-bolt |
| Rossi Hammerless | 12, 20, .410—3" | Greener cross-bolt, top lever break open. Dble. triggers, extractors |
| Star Gauge Double Bbl. Shotgun | 12 ga.—2¾" 20 ga.—3" | Anson & Deeley with double underlocks. Std.—double triggers. Deluxe—single trigger |
| Ugartechea Double Bbl. Shotgun | 12, 20, .410—3" 28 ga.—2¾" | Anson & Deeley. Double triggers |
| Webley & Scott Models 700S, 701, and 702. Double-Barrel Shotgun | 12, 16, 20—2¾" | Boxlock, hammerless, top lever; single trigger optional |
| Webley & Scott Models 720 and 728 | Model .720—20 ga.—3" Model .728—28 ga.—2¾" | Boxlock, hammerless, top lever, nonextension, solid tumblers |
| Zabala Double-Barrel Shotgun | 10 ga.—3½" 12, 20, .410—3" 16, 20—2¾" | Modified Anson & Deeley boxlock; plain extractors |

| Barrel and Choke | Weight | Features |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 20"—12 ga.—IC and M —20 ga.—M and F | 12 ga.—7 lbs. .410—6 lbs. | Matted rib. Imported from Brazil by Garcia |
| 26"—20 ga.—M and F —410 ga.—F and F | | |
| 28"—12 ga.—M and F | | |
| 26"—12, 20 ga.—IC and M —410—F and F | 6-7¾ lbs. | Raised matted rib, bead front. Imported from Brazil by Garcia |
| 28"—12 ga.—M and F | | |
| 26"—IC and M —20 ga.—F and M | 12 ga.—7¼ lbs. 20 ga.—6¾ lbs. | Vent. rib; deluxe has auto. ejectors; recoil pad. Imported from Spain by Interarms |
| 28"—F and M | | |
| 26"—12, 20 ga.—IC and M —28 ga.—M and F —410, F and F | | Engraving. Imported from Spain by Amer. Import |
| 28"—12, 20 ga.—M and F | | |
| 30"—12 ga.—M and F | | |
| Choice of gauges, barrel lengths | 12 ga.—6½ lbs. (28") 16 ga.—6¼ lbs. (28") 20 ga.—6 lbs. (28") | Auto safety; choice of stock measurements, rib styles, recoil pads; special engraving |
| 20 ga.—26"—IC and M 28 ga.—25"—IC and M | 20 ga.—6 lbs. 28 ga.—5½ lbs. | 20 ga.—flat rib; 28 ga.—concave rib; auto safety. From Britain by H&R |
| 22"—12 ga.—IC and IC 26"—410—M and F 26"—12, 20, 28—IC and M | 10 ga.—10½ lbs. 12 ga.—7¾ lbs. .410—6 lbs. | Auto safety; recoil pad. Imported from Spain by Galef |
| 28"—all ga. exc. .410 —M and F 30"—12 ga.—M and F 32"—10, 12 ga.—F and F | | |

Imported Shotguns: Double Barrel (Cont.)

| Model | Gauge | Action |
|-------------------------------------|------------|------------------------------------------------|
| A & F Zanotti Double-Barrel Shotgun | 12, 20, 28 | Boxlock; single nonselective trigger; ejectors |

Imported Shotguns: Over-Under

| Model | Gauge | Action |
|--------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Atlas Model 800 Over-Under Shotgun | 12, 20 ga.—3" | Merkel-type; nonejector, nonselective single trigger |
| Atlas Model 95 Over-Under | 12, 20 ga.—3" | Similar to Model .800 but less engraving |
| Atlas Grand Prix Over-Under Shotgun | 12, 20 | Merkel-type; side locks; auto. ejectors; single selective trigger |
| Atlas Model 65 Over-Under Shotgun | 28, .410 ga.—3" | Merkel-type; extractors; single or double triggers |
| Beretta BL Series Over-Under Shotgun | 12 ga.—2¾" 12 ga.—3" magazine 20 ga.—3" | Hammerless; single selective triggers. BL-3—extractors BL-4—auto. ejectors; unfired shells elevated BL-6—selective auto. ejectors |
| Beretta SO Series Over-Under Shotgun | 12 ga.—2¾" | Sidelock with modified Greener cross-bolt, hand detachable on SO-4 and 5; single selective or double triggers, gold plated on SO-5 only |

| Barrel and Choke | Weight | Features |
|---------------------------------------------|--------|---------------------------------------------------------|
| 26"—IC and M 28"—12 ga. only— M and F | | Custom made. Imported from Italy by Abercrombie & Fitch |

| Barrel and Choke | Weight | Features |
|------------------------|--------|---------------------------------------------------------------|
| 26" or 28"—Std. chokes | 7 lbs. | Vent. rib; highly engraved. Imported from Italy by Atlas Arms |

Similar to Model 800 but less engraving.

| | | |
|-----------------------------|---------|--------------------------------------------------------------|
| 26" or 28"—choice of chokes | 7¼ lbs. | Vent. rib; fully engraved. Imported from Italy by Atlas Arms |
|-----------------------------|---------|--------------------------------------------------------------|

| | | |
|-------------------------------------------|---------|-----------------------------------|
| 26", 28"—IC and M, M and F, skt. and skt. | 5½ lbs. | Imported from Italy by Atlas Arms |
|-------------------------------------------|---------|-----------------------------------|

| | | |
|-----------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------|
| 26"—12, 20 ga.—IC and M, skt. and skt. (BL-4) | 7¼ lbs.—12 ga. 6 lbs.—20, 28 ga. | Vent. rib; gold-plated triggers. |
| 28"—12, 20 ga.—M and F | 7½ lbs.—trap and 12 ga. magazine | BL-3—hand engraving. |
| 30"—12, 20 ga. magazine—M and F | | BL-4—more engraving and checkering. |
| | | BL-6—additional hand engraved sideplates, deluxe checkering. Imported from Italy by Garcia |

| | | |
|------------------------------------------------------------------------------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26"—IC and M 28"—M and F 30"—different combinations avail.; choice of chokes | 7–7¼ lbs. | SO—2, 3, 4, 5 models. Ornamentation varies with grade SO-2 through SO-5. Auto. safety on fld. models; manual on skt. and trap; stock can be custom fitted. Imported from Italy by Garcia |
|------------------------------------------------------------------------------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Imported Shotguns: Over-Under (Cont.)

| Model | Gauge | Action |
|------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------|
| Condor Over-Under Shotgun | 12, 20 ga.—2¾" or 3" chambers | Purdey type double lock; single selective trigger, auto. ejectors |
| Charles Daly Venture Grade Over-Under Shotguns | 12 ga.—2¾" 20 ga.—3" | Boxlock, single inertia trigger; auto. ejectors |
| Charles Daly Field Grade Over-Under Shotgun | 12, 28 ga.—2¾" 12 mag., 20, .410—3" | Boxlock, single selective inertia trigger. Sel. auto. ejectors |
| Charles Daly Superior Grade Over-Under Shotgun | 12, 28—2¾" 20, .410—3" | Boxlock; single selective inertia trigger. "Selector" permits auto. ejection or extraction |
| Falcon Super 8 Over-Under Shotgun | .410—3" | Single, nonselective trigger |
| Franchi Falconet Over-Under Shotgun | 12, 16, 28—2¾" 20, .410—3" | Hammerless, overhead-sear, single selective trigger; auto. ejectors |

| Barrel and Choke | Weight | Features |
|-----------------------------------------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26"—IC and M, skt. and skt. | 20 ga.—26"—6½ lbs.—7 lbs. 7 oz. | Manual tang safety; vent. rib; skt. grade has extra- wide rib, recoil pad. Trap model has wide rib, Monte Carlo stock. Imported from Italy by Kleingunther |
| 28"—F and M, IM and M | (32" 12 ga.) | |
| 30"—12 ga.—IM and F, F and F 12 ga. magazine— F and F, F and M | | |
| 26"—IC and M | 12 ga.—7 lbs. | Vent. rib, manual safety. Imported from Japan by Charles Daly |
| 28"—M and F | 20 ga.—6 lbs. 5 oz. | |
| 26"—12, 20, 28, .410— skt. and skt., IC and M —28, .410—M and F | 12 ga.—7 lbs. Others—about 6¼ lbs. | Auto. safety (exc. skt.). Vent. rib. Mag. has recoil pad. Imported from Japan by Charles Daly |
| 28"—12, 20 ga.—M and F | | |
| 30"—12 ga., skt. and skt. —12 mag., F and F | | |
| Same as field grade plus 28"—12, 20, .410 —skt. and skt. | 12 ga.—7¼ lbs. Others—6 lbs. 10 oz. | Vent. rib. Imported from Japan by Charles Daly |
| 26"—M and F | 5¾ lbs. | Imported by American Import |
| 24"—12, 20 ga.—cyl. and IC | 20 ga.—approx. 6 lbs. | Auto. safety; vent. rib; Skeet and trap models have wide rib, nonauto. safety. 12 ga. also avail. in "Silver" model and in 2 custom models: Imperial Grade and Monte Carlo Extra Grade. 2 skt. and 2 trap models avail. Im- ported from Italy by Stoe- ger Arms |
| 26"—all exc. .410, IC and M —All exc. 16 ga.— skt. and skt. — .410, M and F | Skeet—7½ lbs. Trap—8¼ lbs. | |
| 28"—All ga.—M and F | | |
| 30"—12 ga.—M and F —12 ga. trap—M and F | | |
| | | |

Imported Shotguns: Over-Under (Cont.)

| Model | Gauge | Action |
|----------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Galef Silver Snipe and Golden Snipe Shotguns | 12, 20—3" | Selective single trigger; Purdey type double boxlock with cross-bolt; Silver model—plain extractor; Golden model—selective auto. ejectors |
| Krieghoff Model 32 Over-Under Shotgun | 12, 20, 28, .410 | Boxlock; single selective trigger, ejectors and vent. rib |
| Krieghoff "Tech" Over-Under Shotgun | 12, 16, 20—2 $\frac{3}{4}$ " 20—3" | Boxlock; Kersten double cross-bolt system; with ejectors |
| Lames Over-Under Shotgun | 12—2 $\frac{3}{4}$ " | Boxlock; single selective trigger |
| Lames Over-Under Trap Shotgun | 12—2 $\frac{3}{4}$ " | Boxlock; single selective trigger |
| Laurono Model 71-G Over-Under Shotgun | 12—3" Model 71-G-Ex also has 20 ga. bbls. | Hammerless; double selective triggers |
| Mauser 620 Over-Under Shotgun | 12—2 $\frac{3}{4}$ " | Greener cross-bolt; single, nonselective adj. trigger; auto. ejectors |

| Barrel and Choke | Weight | Features |
|-------------------------------------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| 26"—IC and M —skt. and skt. | 12 ga.— $6\frac{1}{2}$ — $7\frac{1}{16}$ lbs. | Vent. rib; auto. safety exc. on trap and skt. models. |
| 28"—M and F | 20 ga.— $6\frac{1}{4}$ lbs. | Gold bead on field models; ivory bead on trap and skt. models |
| 30"—M and F —trap, F and F | | |
| 28", 30", 32" bbls. Other barrel lengths, chokes to order. Four bbl. skt. sets (1 each ga. avail.) | Varies | Std., plus 4 other grades avail., depending upon extent of engraving and inlaid work. Imported from Germany by Krieghoff Gun Co. |
| 28½"—Full and M Also comes with rifle barrels | 7 lbs. | Interchangeable bbls.; vent. rib. Imported from Germany by Unordco. |
| 26"—IC and M 28"—IC and M, M and F 30", 32"—IM and F —F and F | | Auto. safety; vent. rib. Imported by LA distributors |
| 30", 32"—F and F —M and F | | Manual safety; double vent. rib; recoil pad; fitted ga. avail.; Monte Carlo |
| 26"—IC and M 28"—F and M 30"—F and F —F and M 28"—20 ga.—F and M | | Auto. safety; recoil pad. Imported from Spain by Jana |
| 28"—M and F —IC and M —skt. and skt. 30"—F and M | 7½ lbs. | Vent. rib; selective or double triggers and engraving at extra cost; recoil pad. Imported from Germany by Mauser Bauer |

Imported Shotguns: Over-Under (Cont.)

| Model | Gauge | Action |
|---------------------------------------------------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------|
| Mauser 610 Phantom Over-Under Shotgun | 12—2¾" | |
| Gerbruder Merkel 201E Over-Under Shotgun | 12, 16, 20—3" | Kersten double cross-bolt; double, single, or single selective trigger |
| Gerbruder Merkel Model 203E Over-Under Shotgun | 12, 16, 20—3" | Merkel H&H hand-detachable side locks; double cross-bolt breech; double, single, or single selective trigger |
| Miida Model 612 Over-Under Shotgun. Model 2100—Skeet. Model 2200—Trap and Skeet | 12 ga. only—2¾" | Boxlock type; auto. sel. ejectors; single sel. trigger |
| Miida Model 2300 Trap and Skeet | | |
| Miida Model Grandee Trap and Skeet | 12 ga. only | Boxlock; ejectors and locking levers, engine-tuned |

| Barrel and Choke | Weight | Features |
|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26", 28"—skt. 30", 32"—trap Skt. set avail. with Pur- baugh tubes in 26" or 28" in 12, 20, 28, .410 ga. | 8 lbs. | Double vented bbls.; raised rib; recoil pad |
| Made to customer specs with choice of chokes | 7½ lbs. | Cocking indicators; en- graving. Model 200E has Arabasque engraving and color case-hardening with single nonselective trigger. Imported by Champlin Firearms |
| Made to customer specs with choice of chokes | 7½ lbs. | Stock to customer specs. Cocking indicators; en- graving; Model 303E has double hooking bolt with double crossbolt breech; finer quality than 203E. Imported by Champlin Firearms |
| 26"—M and IC 28"—F and M. Mdl. 2100, skt. and skt.— 27" bbl. Mdl. 2200— skt. and skt.—27" bbl. Also 29¾"—F and IM (trap) | 6¾ lbs.; Model 2100—7¾ lbs. | Vent. rib; Tang safety. Model 2100 has 50% engraving. Model 2200— 60% engraving, skt. or trap stock; trap has pad |
| 27"—skt. and skt. 29¾"—F and IM | | Model 2300 has 70% en- graving. Imported from Japan by Marubeni Corp. |
| 26"—skt. and skt. 29"—F and F | | Wide vent. rib; fully en- graved, fine checkering; skt. or trap stock; trap has pad. From Japan, by Marubeni |

Imported Shotguns: Over-Under (Cont.)

| Model | Gauge | Action |
|--------------------------------------------------------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------|
| Parker Brothers Field Model Over-Under | 12—3" 12—skt. or trap— 2¾" | Auto. ejectors; single sel. trigger |
| A and F Perazzi Over-Under Shotgun | 12 | Boxlock; interchangeable double or single trigger assemblies |
| Zoli Gray Eagle Over-Under Shotgun | 12—Model 300—3" 20—Model 302—3" | Hammerless, top lever release; single trigger—selective or nonselective (choice) |
| Zoli Silver Snipe Over-Under Shotgun, and Zoli Golden Snipe Over-Under Shotgun | 12, 20—3" | Purdey type double boxlock, cross-bolt; single trigger. Golden Snipe Model has selective auto. ejectors |

Imported Shotguns: Bolt Action

| Model | Gauge | Action |
|-----------------------------|-------|--------|
| Dickson Bolt Action Shotgun | .410 | Bolt |

| Barrel and Choke | Weight | Features |
|--------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26"—IC and M, skt. and skt. 28"—M and F 30"—M and F, F and F Trap Models, 30"—F and F, or M and F, or 32"—IM and F | 8½ lbs. | Recoil pad; vent. rib with front bead; special dbl. vent. rib model has vent. separation between bbls. Std. trap model has vent. rib and Monte Carlo stock front and center sights. Calif. trap model same as std. trap except dbl. vent. and luminous front and center sights. Skeet model has dbl. vent. ribs. Imported from Italy by Jana |
| 26"—skt. 28"—pigeon 29"—trap | 7-7½ lbs. | Vent. rib. Avail. Pigeon, Trap, or Skt. models. Imported from Italy by Abercrombie & Fitch |
| | 12 ga.—6 lbs. 13 oz. 20 ga.—6¼ lbs. | Auto. safety; vent. rib. Imported from Italy by American Import |
| 26"—IC and M —skt. and skt. 28"—M and F 30"—12 ga. only—M and F 30"—trap—F and F | 6½ lbs. | Auto. safety (exc. skt.); vent. rib. Imported from Italy by Galef |
| Barrel and Choke | Weight | Features |
| 25"—Full | 5 lbs. 5 oz. | Sliding thumb safety; 3-round capacity. Imported from Europe by American Import |

Imported Shotguns: Single Shot

| Model | Gauge | Action |
|------------------------------------------------|-------------------------------|-----------------------------------|
| Atlas Single Barrel Trap Gun | 12 ga. only | Boxlock, auto. ejector |
| Beretta Mark II. Single Barrel Trap Shotgun | 12 ga. only—2¾" | BL type, top snap tip down |
| Beretta TR-2 Trap Shotgun | 12—2¾" | Hammerless, under-bbl. release |
| Daino Single Barrel Shotgun | 12, 20, .410 | Folding, underlever |
| Galef Companion Single Barrel Shotgun | 12, 20, .410—3" 16, 28—2¾" | Folding, boxlock |
| Krieghoff Single Barrel Trap Shotgun | 12—2¾" | Boxlock, short hammer fall |

| Barrel and Choke | Weight | Features |
|--------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 30", 32"—Extra Full | 8 lbs. | Vent. rib; Monte Carlo stock of trap dimensions; recoil pad; engraved; avail. std. or deluxe models (custom engraving and gold letters). Imported from Italy by Atlas Arms |
| 32", 34"—Full | 8¼ lbs. | Vent. rib; recoil pad; Monte Carlo stock; hand engraved. Imported from Italy by Garcia |
| 32"—Full | 8¼ lbs. | Vent. rib; Monte Carlo stock; recoil pad; cross-bolt safety; hand engraved. Imported from Italy by Garcia |
| 27½"—F or M | 5½ lbs. | Folds to 27½"; plain or vent. rib; engraved action. Imported by Kleingunther |
| 26"—.410—F 28"—All gauges except 12 ga.—F 30"—12 ga.—F | 4½ (.410)—5½ (12 ga.) | Nonauto. safety; folding; vent. rib extra. Imported from Italy by Galef |
| 32", 34"—Full | 8½ lbs. | Thumb safety; vent. rib; Monte Carlo stock; extra bbls. avail. Comes in 5 grades, depending upon wood and construction: Std., San Remo, Monte Carlo, Crown, Super Crown. Imported from Germany by Krieghoff Gun Co. |

Imported Shotguns: Single Shot (Cont.)

| Model | Gauge | Action |
|-------------------------------------------|--------|--------------------------------------------------------|
| Krieghoff Vandalia Trap Model | 12—2¾" | Boxlock, selective single trigger, ejectors |
| Mauser Model 496 Single Barrel Shotgun | 12—2¾" | Greener type cross-bolt; 4 locking lugs; auto. ejector |
| Monte Carlo Single Barrel Shotgun | 12—2¾" | Auto. ejector; Monte Carlo action; bottom release |

| Barrel and Choke | Weight | Features |
|----------------------------------------------------------------------------|---------|------------------------------------------------------------------------------------------------------------------------|
| 30", 32", 34"—avail. as single or over-under; other bbls., chokes to order | 9 lbs. | 3-way safety: manual, auto., or Inoperative; vent. rib; 5 different grades. Imported from Germany by Krieghoff Gun Co. |
| 32"—M 34"—F | 8 lbs. | No manual safety; front and middle sights; Monte Carlo stock. Imported from Germany by Mauser Bauer |
| 32"—trap | 8¼ lbs. | Slide Safety. Imported from Italy by Galef |

Shotgun Stock and Fit

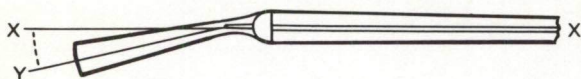
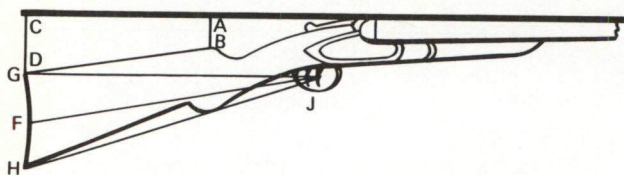
Stock Measurements

Five measurements are important in determining whether or not a shotgun stock fits. These are:

1. Length of pull.
2. Drop at comb.
3. Drop at heel.
4. Pitch.

5. Cast-off (or "on" for a left-handed shooter).

These measurements are shown in the three drawings on this and the next page.



Measurements of shotgun stock.

F-J is length of pull. On a shotgun with two triggers, this measurement is taken from the front trigger as shown. A-B is drop at comb; C-D is drop at heel. When you see a shotgun with measurements of 14" \times 1½" \times 2½", you know the 14" is length of pull, the 1½" is drop at comb, the 2½" is drop at

heel. The difference between *X* and *Y* is cast-off. Pitch is simply the angle at which the butt is cut. It is measured at the muzzle by determining the distance vertically from the muzzle of a shotgun to a line drawn at right angles to the butt and tangent to the standing breech. One way to do this is to stand the shotgun with its butt on the floor and the action touching a wall. The measurement from the muzzle to the wall is the pitch.

Length of Pull

Length of pull is the measurement from the trigger to the middle of the buttplate; *F*—*J* on the diagram. If this measurement is too long, the shooter will catch the heel of the stock on his clothes under his armpit as he tries to raise the shotgun to his shoulder. Or, once at his shoulder, the gun will feel uncomfortable as he strains to reach the trigger. If pull length is too short, the recoil will drive the shooter's thumb into his nose each time the gun is fired. The proper length of pull is one that allows the shooter to mount the gun to his shoulder easily, clearing his clothes and keeping his thumb a safe distance from his nose. This usually requires a gap of at least $\frac{3}{4}$ " between thumb and nose. Recoil drives the gun back about half an inch, so a $\frac{3}{4}$ " gap prevents the nose blow.

Factory guns for field use and skeet shooting have a length of pull of about 14", which is average for a man 5'8" to 5'10" tall. A taller man usually needs a pull of from 14 $\frac{1}{4}$ " to 14 $\frac{1}{2}$ ". A woman or boy from about 5' to 5'6" needs a pull length of about 13 $\frac{1}{2}$ ".

Many youth shotguns have pull lengths of $12\frac{1}{2}$ ". Shotguns used for trap shooting have longer lengths of pull, because the shooter mounts his gun before he calls for his target. Lengths of $14\frac{1}{2}$ " to $14\frac{3}{8}$ " are most common.

Drop at Comb

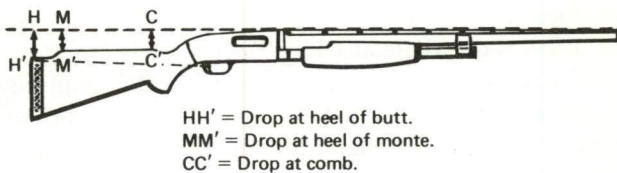
The drop at comb is the distance from the top of the comb to the line of sight. (See A-B on the diagram illustrating stock measurements.) Comb drop is one of the most important measurements, since the cheek rests on the comb so the eye can be aligned along the barrel. If the comb is too high, the eye is too high, and the shooter sees too much barrel and raises the gun muzzle in compensation. As a consequence, he shoots high. If the comb is too low, the eye is too low, so the shooter will try to lower the muzzle to see along the line of sight. As a result, he shoots too low. Improper comb height prevents the gunner from developing speed in his shooting, since he must try constantly to adjust his sighting plane. The right amount of drop will enable the shooter to press his cheek hard against the comb and to look directly down the shotgun rib or barrel. Unless he gets his eye in the proper sight plane, his shooting will be off.

The typical standard comb has a drop of $1\frac{1}{2}$ inches. A few have less or more than this: $1\frac{1}{4}$ ", $1\frac{3}{8}$ ", or $1\frac{5}{8}$ ". Some youth models have a drop of $2\frac{1}{4}$ ". Generally, shotguns for trap shooting have a higher comb than shotguns for field or skeet shooting, since

the trap shooter's targets are rising sharply and he needs a built-in lead so he can shoot *at* a bird going straightaway and still hit it. If the comb is low, the trap shooter must raise his barrel over the target and blot it out in order to hit it. This aiming procedure is not easy and is not conducive to accurate shooting. Therefore, comb drop for trap guns usually varies from $1\frac{1}{4}$ " to $1\frac{1}{2}$ ", with $1\frac{3}{8}$ " very common. Many trap guns utilize a Monte Carlo bomb, since the cheekpiece is high and is carried all the way back in a straight line, dropping down to the heel only several inches short of the butt itself.

Drop at Heel

The drop at heel is the distance between the line of sight and the heel of the stock (See C-D on diagram illustrating stock measurements.) The typical factory-made stock has a drop at heel of $2\frac{1}{2}$ ". Fat, round-shouldered, bull-neck shooters may need an even greater drop than this, as might beginning shooters, primarily because they have trouble getting their cheek down on the stock. Guns with excessive drop at heel are hard to mount and shoot,



Measurements of a Monte Carlo stock.

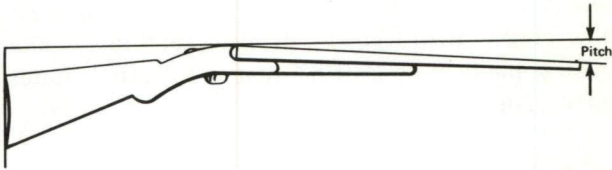
however, and recoil is felt more when using them than when using a straighter stock, since the crooked comb rises with the recoil and cracks the shooter on the cheek. For these reasons, some experts like stocks that are almost straight, with very little drop at heel or with heel drop not much greater than comb drop. Trap guns often have quite a straight stock, with drop at heel ranging from $1\frac{1}{2}$ " to $1\frac{7}{8}$ ". Trap shooters like these because the straight stock lessens recoil and aids in fast pointing. In fact, with the level Monte Carlo comb, it does not matter where the shooter positions his cheek; the elevation of the barrel will be the same. With a stock sloping sharply downward, the farther back the shooter places his cheek, the lower it will be, necessitating his lowering the elevation of the muzzle to see over it. The point is, it is hard to mount the gun with the cheek at the same position each time, so unless the cheekpiece is fairly level, the variation in cheek positions results in variations in muzzle elevation while sighting, causing inaccurate shooting. Therefore, one should shoot the gun with the straightest stock one can easily mount to one's shoulder.

Pitch

Pitch is the angle at which the buttplate is set on, and it is measured from the muzzle. This angle is important, because it determines whether or not the butt of the shotgun fits firmly against the shoulder. If there is too little downward pitch (too short a stock at the heel), the butt has a tendency to slip down, throwing the gun muzzle up so the shot goes high. If there is too much downward pitch (too long

a stock at the heel and too short at the toe), the butt slips up on the shoulder, throwing the gun muzzle downward so the shot goes low.

The only way to determine whether or not your gun has the proper pitch is to throw the gun to your shoulder as in normal shooting. If the pitch is right,



How pitch of shotgun stock is measured.

the butt will stick evenly and firmly under your armpit. If the butt slips up or down, and you are sure both the pull and the drop are right, you can alter the angle of the buttplate or recoil pad by removing it and taking off or adding to some of the heel or toe, depending on the change of angle needed. A proper correction should allow the whole butt to rest firmly against the shoulder. After the correction, the buttplate or recoil pad is replaced. (See a later section of this book on altering a stock to fit.)

Cast-Off

Cast-off is the diversion of the stock to one side, so when the butt is placed against the shoulder your aiming eye will look down a line drawn up the center of the barrel or rib. (See the drawing of cast-

off under the section on stock measurements.) The degree of cast-off is the length of the horizontal distance from your eye to the center line of the barrel. Cast-off is intended to compensate for the lateral distance between the eye and cheekbone, much as drop at comb does for the vertical distance. Most guns come with a slight cast-off, approximately $\frac{1}{4}$ ", with the toe cast off more than the heel to allow the stock face to follow the structure of the shooter's cheek. British-made shotguns are more commonly made with cast-off than are United States-made guns.

The Shotgun Grip

Shotgun grips may be classified in four basic types:

1. Straight or English grip.
2. Full pistol grip.
3. Half pistol grip.
4. Monte Carlo grip.

Most American-made shotguns have a full pistol grip. Since automatics and pump shotguns became so popular, and single triggers on double and over-under guns became common, the pistol grip has become almost universal in the United States. Such grips allow the shooter to maintain a firm hold on the stock, giving maximum control over the gun while the wrist and hand are at a natural, comfortable angle. The so-called "half pistol grip" is a compromise between a straight grip and a full pistol grip. It can be obtained by special order, or comes

as standard equipment on some models of Browning shotguns. On this type of grip, the stock does not curve as rapidly downward back of the trigger guard as it does on the full pistol grip.

The straight or "English" grip was developed in the days of the breech-loading double shotgun, to permit the movement of the hand front and back on the stock to shift from one trigger to the other. This type of grip is still manufactured on British and other European shotguns and on a few specially made American guns. Some shooters feel the lines of such guns are sleeker and more graceful in appearance than are those with full pistol grips, but they have never become very popular in the United States. The straight grip tends to cramp the wrist and give the shooter less control over his gun. Also, there is an occasional tendency for the gun to shoot high.

Stocks with pistol grips and high combs and cheekpieces, such as those with Monte Carlo stocks, reflect a German, Austrian, and Czech influence. They often have a lot of drop at heel, but far back on the stock, and are often relief engraved with animals, birds, oak leaves, or other designs on the stock and breech. A high cheekpiece is really not necessary on a hunting gun, but those with high, level cheekpieces are favorites of trap shooters. However, the trap shooter does not have to carry his gun through the brush all day. If he did, he would probably agree with the hunter, that a lighter, shorter stock is more practical. Monte Carlo

stocks look bulky and unwieldy. Whatever advantages they may have for the trap shooter, they are not very graceful looking guns.

Barrel, Gauge, Choke, and Pattern

Gauge and Bore Diameter

At the present time, United States shotshells are manufactured in six gauges: 10, 12, 16, 20, 28, and .410. Originally, gauge (except for the .410) was determined by the number of lead balls of a particular bore diameter it took to weigh a pound. Thus, it took ten 10-gauge, or twelve 12-gauge, round lead balls to weigh a pound. Today, however, twelve round balls would not weigh a pound. The reason is that the balls have to be made smaller than the bore diameter to get through the choke. Therefore, gauge is now a designation of a particular bore diameter. Actually, the .410 was never a gauge; it was always a caliber indicating bore diameter.

Barrel Length

There is really no need to buy a shotgun with a barrel length over 28", except perhaps for trap shooting, for which a 30" barrel gives a longer sighting plane. In fact, for upland game shooting, a barrel length of 24" to 26" is best since it gives a light, fast gun that is easy to swing on target and not tiring to carry. The waterfowl gun, even for pass shooting, need not be over 28", even though 30" is more commonly used. For an all-around gun

for upland game, waterfowl, and deer slugs, the preferred length is 26".

Why, then, are there so many hunters who think a long barrel is needed in order to have a hard-hitting, long range shotgun? The reason is that old ideas die hard, and hunters hesitate to change opinions that have been handed down from generation to generation. When slow-burning black powder was used to propel shot charges, a gun did need a long barrel to give time for the shot to gain velocity before leaving the barrel. But with modern, smokeless, fast-burning powder, the extra barrel length is no longer necessary. Maximum velocity is reached in 24" to 26" of barrel. If the barrel is much longer, the friction of the shot passing through the inside of the barrel will actually decrease velocity. Therefore, shot velocity should not be a consideration in selecting barrel length except to suggest that maximum velocity does not demand a barrel longer than 26". Even a barrel as short as 22" does not significantly reduce shot velocity. For example, if a hunter has a 22" barrel and shoots at a crossing bird flying at a speed of 6 mph at a distance of 20 yards, he would have to increase his lead by only 5" over the man using a 30" barrel. Remember, this is while using a shotgun with only a 22" barrel. Therefore, a difference in barrel length of 5" (25" versus 30") makes no significant difference in shot velocity, but it may make considerable difference in ease of handling the gun. A double or over-under 12 gauge barrel weighs about 1½ ounces per inch, so the difference in weight between a 26" and 32"

barrel is 9 ounces, enough to make quite a difference when hanging on the end of a shotgun. Put a half-pound weight on the end of your shotgun barrel sometime and see how much difference it makes in your ability to swing, aim, and shoot fast. Use a barrel of fairly reasonable length, therefore: 26" is best all-around, 24" is better for upland game, 28" is alright for waterfowl if you insist on one this long, and 28" or 30" is standard if for trap shooters.

Common Chokes and Pattern Percentage

Choke is the constriction on the end of the barrel, which keeps the shot from scattering so as to assure a fairly tight pattern of shot at medium to far ranges. Full choke gives the maximum constriction and the tightest pattern, so is most useful at long ranges. Open cylinder means no constriction of the barrel and thus allows a wide separation of shot. There is also a reverse cylinder where the end of the barrel is of greater diameter than the bore, allowing for maximum spread of shot.

The most common chokes are listed in the table. Pattern percentage is the percent of the total shot found within a 30" circle at 40 yards.

The table actually gives approximate pattern percentages. Since there is no standardization that requires the manufacturer to design his chokes to conform to these figures, there may be considerable variations in guns that supposedly have the same choke. One gun marked "full" may provide the same pattern as another gun marked "modified." Furthermore, the same gun may perform somewhat

Common Chokes and Pattern Percentages

| Choke | Pattern Percentage |
|------------------------------------------|--------------------|
| Full | 70-80 percent |
| Improved Modified ($\frac{3}{4}$ choke) | 65-70 percent |
| Modified ($\frac{1}{2}$ choke) | 55-65 percent |
| Quarter choke ($\frac{1}{4}$ choke) | 50-55 percent |
| Improved cylinder | 45-50 percent |
| Skeet No. 2 | 50-60 percent |
| Skeet No. 1 (Cylinder) | 35-40 percent |

differently with different shotshells and size of shot. Therefore, the only practical way to ascertain the degree of choke of a particular gun is to pattern it. (See the directions in a succeeding section.)

Size of Shotgun Patterns

The shooter needs to be aware of the size of patterns at various ranges with different degrees of choke. The table gives the average spread of shot charges at various ranges. There is some difference in the patterns made by shells from different manufacturers, so the figures are only approximate.

Spread of Shot Charges (in inches) at Various Ranges with Different Degrees of Choke

| Degree of Choke | Range in Yards | | | | | | | | | |
|-----------------------|----------------|----|----|----|----|----|----|----|----|--|
| | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | |
| Cylinder | 19 | 26 | 32 | 38 | 44 | 51 | 57 | | | |
| Improved Cylinder | 15 | 20 | 26 | 32 | 38 | 44 | 51 | | | |
| Half Choke (modified) | 12 | 16 | 20 | 26 | 32 | 38 | 46 | 54 | 66 | |
| Full Choke | 9 | 12 | 16 | 21 | 26 | 32 | 40 | 48 | 60 | |

The upland game hunter who shoots quail, grouse, or woodcock in the brush at close ranges, usually at ranges under 20 yards, needs a barrel with a very open choke: cylinder or improved cylinder. One local woodcock hunter uses a reverse choke gun, hitting his birds as soon as he flushes them. He seldom misses, primarily because he throws an ideal pattern for close ranges. A duck hunter shooting at ranges from 40 to 50 yards, however, needs a modified or full choke to throw a dense enough pattern.

For most shooting, the hunter should confine his shots to ranges where at least 50 percent of his shot is in a 30" circle. This means maximum ranges of about 38 yards for improved cylinder, 52 yards for modified choke, and 60 yards for full choke.

Patterning the Shotgun

How do you go about patterning your shotgun? The easiest way is to get a roll of wrapping paper 48" wide and cut it into 4" squares. Tack the squares to a wooden frame or to a piece of hardboard as you need them. In addition, in order to have a point of aim, paint a black bullseye in the exact center. A bullseye about 1' in diameter is about right. Set the target up securely, measure off exactly 40 yards away, and fire a test shot. Before doing anything else, be sure your point of aim has been in the center, as indicated by the location of most of the shot. If for any reason you have shot high, low, or to one side, correct this on the next shot by adjusting your point of aim. When your

shot is well centered on the paper, shoot five times, using a separate sheet of paper for each. Since pattern is determined by counting the percentage of shot in a 30" circle at 40 yards, inscribe a 30" circle enclosing the most holes on each of the five targets. Then count the holes within each circle, and compare each total on a percentage basis with the total number of shot in a charge. To determine the total shot in a charge, open a shell and count the pellets, but be certain to do this with the make shell and size shot you are using in the patterning, for shot loads vary slightly from one manufacturer to another. Finally, to determine the choke of your gun, see the table in the previous section on common chokes and pattern percentage.

Since much shooting is done at ranges less than 40 yards, it is also helpful to know how your gun performs at 10, 20, and 30-yard ranges also. Mark off these distances and fire at your paper targets to ascertain the pattern. You may be surprised at how tight the pattern of your gun is and decide to use barrels with more open choke.

Choke Constriction

Choke is the difference between bore diameter and muzzle diameter measured in thousandths of an inch. The measurement is also designated in points. For example, a difference between bore diameter and muzzle diameter of .040 inches is a choke of 40 points. In the old days, a full choke, 12-gauge barrel was one with a choke of 40 points. Three-fourths choke (improved modified) for this barrel

was 30 points; $\frac{1}{2}$ choke (modified) was 20 points; $\frac{1}{4}$ choke (strong improved cylinder) was 10 points. Today, however, there is a tendency for manufacturers to vary the size of the bore of a particular gauge gun. The 12-gauge gun is supposed to have a bore of .729 inch, yet some run as small as .722 and others as large as .747. Manufacturers tend to "overbore" their barrels rather than underbore. Because of this, the same choke device on different size barrels will result in different amounts of constriction and variations in patterns.

There are various systems of choke construction. These may be listed and described as follows.

1. **The taper choke**, also called the American choke. This type utilizes a gradual decreasing diameter of the bore as one gets closer to the muzzle. Actually the taper is not cut in a straight line, but with a slightly curved radius.

2. **The standard choke**, also called an English choke. It utilizes a taper plus a parallel portion, or "lede," at the end of the barrel.

3. **The swaged choke** is made by tapering both the outside and inside of the muzzle. It is used on inexpensive guns and is made by driving the muzzle into a die, rather than inserting a reamer inside the barrel.

4. **The recess or jug choke** is not a factory made choke, but is usually made by hand by cutting a recess in the inside of the end of the barrel with a rod and emery cloth. It can be made to give patterns up to 60 percent.

5. The bell or reverse choke is made by boring out the inside of the end of the muzzle so this section is wider than the bore.

Variable or Interchangeable Choke Devices

Choke devices can be divided into five basic types.

1. The plain collet.
2. The collet with muzzle brake.
3. The automatic choke.
4. The plain screw-on tube.
5. The tube with ventilated cage.

The *plain collet* is a variable choke device, which gives different degrees of constriction with the same adjustable tube by simply turning a knurled sleeve. Turn the sleeve clockwise (looking at the end of the muzzle) and the fingers of the tube are squeezed together to decrease the diameter and increase the degree of choke. Turning the sleeve counterclockwise opens the tube and decreases the amount of choke. This type of choke device can be adjusted by hand and is the easiest of all types to adjust. The setting may include reverse choke, which is more open than true cylinder and is used with rifled slugs, or at the other extreme it may include a full, full choke, giving tighter patterns than just full choke. Any choke device that is screwed too tight will start to give an uneven pattern, however, so the shooter needs to learn, by patterning, the maximum choke he can obtain with his device. Also, he should pattern at each setting to determine the

optimum settings for various types of shooting. He may find, for example, that a modified ($\frac{1}{2}$) setting will give him a full choke pattern and that a tighter adjustment is not necessary. The only way to really find out is to pattern the gun with the device attached.

Sometimes, the variable device is put on carelessly. If it is not properly aligned, the device may throw the shot to one side or low. Or if it is not properly attached, the device itself may fly off when the gun is fired.

There are several fine adjustable choke devices on the market. One of the most well-known and easily adjusted is the Poly Choke, which it comes in either a standard or a ventilated model. The barrel is sent to the company, cut off to the proper length, and the Poly Choke installed. The writer has used a Poly Choke for years and finds it gives marvelous versatility to his old 12-gauge automatic. The gun can now be used on the smallest birds, the largest geese, or even with slugs for deer. Variable chokes are also offered by Lyman, Herter's (which sells the Vari-Choke), Emsco, and other manufacturers. Some gun manufacturers, such as Hi-Standard, Mossberg, Smith and Wesson, and Western, offer variable choke devices on some models of their guns as optional equipment.

The *collet with muzzle brake* is like the plain collet except that venting slots or holes have been added to let gas escape to reduce shotgun recoil. The Poly Choke and Lyman and Herter's variable

chokes can be obtained with or without recoil reducers.

The *automatic choke* is a variable choke device whose setting changes automatically each time the gun is fired. The first manufactured was one called the Jarvis Flex Choke. It changed in three shots from open or modified to full. However, it was heavy, expensive, and complicated, so was never widely accepted. After that the Adjustomatic (Hartford Gun Choke Company) and Poly-Matic (Poly Choke Company) were introduced, but they never really became popular and were discontinued.

The *plain screw-on tube* or *the tube with ventilated cage* are the last two types of choke devices. These are interchangeable choke tubes, which are screwed into the end of a muzzle attachment to give various degrees of choke. The plain tube has no vents to reduce recoil; the tube with ventilated cage does. These are quite popular and widely used. The Cutts Compensator is one of the best known. Manufactured by Lyman, it is available with either a steel or aluminum body. The full, modified, and spreader chokes are available in 12, 16, 20, 28, and .410 gauges. The adjustable tube is available in 12, 16, 20, and 28 gauges. The 755 tube (improved cylinder) and long-range tubes No. 2 and No. 3 are available in 12 gauge only. Note that the choke tubes of this compensator fit on any expansion chamber which, in turn, gives recoil reduction by venting excess expanding gases. The expansion chamber is attached to an adapter fitted to the barrel.

Shotshells, Loads, and Shot

Shell Designation

Every shell is labeled according to gauge, drams of powder, ounces of shot, and shot size. A shell labeled No. 12, $3\frac{3}{4}$ — $1\frac{1}{4}$ — 6 is 12 gauge, has $3\frac{3}{4}$ drams of powder and $1\frac{1}{4}$ ounces of shot of No. 6 size. In addition shells are given designations like brush loads, scatter loads, field loads, express loads, magnum loads, buckshot loads, or rifled slug loads. Also, each manufacturer uses its own nomenclature on the different types of shotshells. Remington has its "Shur Shot Field Loads," its "Express Long Range Loads," or its "Power-Pakt Express Magnum Buckshot Loads." Winchester-Western refers to its "Super-X Mark 5 Game Loads," its "Super-X Mark 5 with Lubaloy (Copperized Shot)," or its "Super-X Rifled Slug Loads (not Mark 5)." Peters sells its "Plastic Target Loads—Power Piston Wad," "Victor Shotgun Loads—Power Piston Wad," or "High-Velocity Extra Long Range Shotgun Shells—Power Piston Wad." Is it any wonder that the various designations get confusing?

The nomenclature is not as difficult as it sounds, however. All manufacturers offer one or more, or all, of the following types of loads.

Magnum loads. These can be of two types: $2\frac{3}{4}$ " magnums, which are used in shotguns with standard-size chambers, or 3" magnums ($3\frac{1}{2}$ " for 10 gauge), which require especially long chambers to accommodate them. In most cases, the shorter magnum shells can also be used in guns with the longer magnum chambers.

Long-range loads. So-called express, hi-power, or high-base shells. These are the most commonly used shells for all-around hunting, lacking the maximum power of the magnums but also having less recoil. They have adequate range, sufficient shot charge, and enough killing power for all but the largest birds at longest ranges.

Field loads. These are the lowest power used in ordinary hunting. They are sometimes designated low-base shells because of the shorter brass base at the foot of the shell. They are used for short-range, small game and bird hunting situations. They are more than adequate for quail, woodcock, squirrels, and other small game.

Scatter loads. Also called brush loads, these are low-base shells especially designed to scatter small shot over a wide pattern for close-range upland bird shooting.

Target, skeet, and trap loads. The name implies, they are especially designed to meet official requirements for trap and skeet shooting or to meet the needs of the home target shooter.

Buckshot loads. These are manufactured in regular 2 $\frac{3}{4}$ " shells, or in 3" magnums. Their uniqueness is in the fact that they are loaded with buckshot, obtainable in sizes 00, 0, 1, 3, or 4.

Rifled slug loads. This is a single projectile in each shell, used primarily in close range deer hunting.

Shotshell Loads

The following table lists the various shotshells manufactured in the United States today. Manufac-

turers may differ slightly in the shot sizes offered, but in general all makes offer equivalent loads.

Shotshell Loads

Winchester-Western, Remington-Peters, Federal, Eley & S&W/Fiocchi

In certain loadings one manufacturer may offer fewer or more shot sizes than another, but in general all makers offer equivalent loadings. Sources are indicated by letters, thus: W-W (a); R-P (b); Fed. (c); Eley (d).

| Gauge | Length Shell Ins. | Powder Equiv. Drams | Shot Ozs. | Shot Size |
|-------------------------------------|-------------------------|---------------------------|--------------|-----------------------|
| Magnum Loads | | | | |
| 10 (a ¹ , b) | 3½ | 5 | 2 | 2 |
| 12 (a, b, c) | 3 | 4½ | 1⅞ | BB, 2, 4 |
| 12 (a ¹ , b) | 3 | 4¼ | 1⅝ | 2, 4, 6 |
| 12 (a) | 3 | Max | 1¾ | 2, 4, 6 |
| 12 (a ¹ , b, c, d) . . . | 2¾ | 4 | 1½ | 2, 4, 5, 6 |
| 16 (a, b, c, d) . . . | 2¾ | 3½ | 1¼ | 2, 4, 6 |
| 20 (a, b, c) | 3 | 3¼ | 1¼ | 4, 6, 7½ |
| 20 (a ¹) | 3 | Max | 1¾ | 4 |
| 20 (a ¹ , b, c, d) . . . | 2¾ | 3 | 1⅞ | 2, 4, 6, 7½ |
| Long-Range Loads | | | | |
| 10 (a, b) | 2⅞ | 4¾ | 1⅝ | 4 |
| 12 (a ¹ , b, c, d) . . . | 2¾ | 3¾ | 1¼ | BB, 2, 4, 5, 6, 7½, 9 |
| 16 (a, b, c, d) . . . | 2¾ | 3¼ | 1⅞ | 4, 5, 6, 7½, 9 |
| 20 (a ¹ , b, c, d) . . . | 2¾ | 2¾ | 1 | 4, 5, 6, 7½, 9 |
| 28 (a, b) | 2¾ | 2¼ | ¾ | 6, 7½, 9 |
| 28 (c) | 2¾ | 2¼ | ⅞ | 4, 6, 7½, 9 |
| Field Loads | | | | |
| 12 (a, b, c) | 2¾ | 3¼ | 1¼ | 7½, 8 |
| 12 (a, b, c, d) . . . | 2¾ | 3¼ | 1⅞ | 4, 5, 6, 7½, 8, 9 |
| 12 (a, b, c, d) . . . | 2¾ | 3 | 1 | 4, 5, 6, 8 |
| 16 (a, b, c, d) . . . | 2¾ | 2¾ | 1⅞ | 4, 5, 6, 7½, 8, 9 |
| 16 (a, b, c) | 2¾ | 2½ | 1 | 6, 8 |
| 20 (a, b, c, d) . . . | 2¾ | 2½ | 1 | 4, 5, 6, 7½, 8, 9 |
| 20 (a, b, c) | 2¾ | 2¼ | ⅞ | 6, 8 |
| Scatter Loads | | | | |
| 12 (a, b) | 2¾ | 3 | 1⅞ | 8 |

Shotshell Loads (Cont.)

| Gauge | Length Shell Ins. | Powder Equiv. Drams | Shot Ozs. | Shot Size |
|------------------------|-------------------------|---------------------------|--------------|--------------------|
| Target Loads | | | | |
| 12 (a, b, c) | 2¾ | 3 | 1⅞ | 7½, 8 |
| 12 (a, b, c) | 2¾ | 2¾ | 1⅞ | 7½, 8 |
| 16 (a, b, c) | 2¾ | 2½ | 1 | 9 |
| 20 (a, b, c) | 2¾ | 2¼ | ⅞ | 9 |
| 28 (a, c) | 2¾ | 2¼ | ¾ | 9 |
| .410 (a, b, c, d) . . | 3 | Max | ¾ | 9 |
| .410 (a, b, c) | 2½ | Max | ½ | 9 |
| Skeet and Trap | | | | |
| 12 (a, b, c, d) . . | 2¾ | 3 | 1⅞ | 7½, 8, 9 |
| 12 (a, b, c, d) . . | 2¾ | 2¾ | 1⅞ | 7½, 8, 9 |
| 16 (a, b, c, d) . . | 2¾ | 2½ | 1 | 9 |
| 16 (c) | 2¾ | 1⅞ | 1⅞ | 8, 9 |
| 20 (a, b, c) | 2¾ | 2¼ | ⅞ | 9 |
| Buckshot | | | | |
| 12 (a, b, c) | 3 Mag. | 4½ | — | 00 Buck—12 pellets |
| 12 (a, b, c) | 3 Mag. | 4½ | — | 4 Buck—41 pellets |
| 12 (b) | 2¾ Mag. | 4 | — | 1 Buck—20 pellets |
| 12 (a, b, c) | 2¾ Mag. | 4 | — | 00 Buck—12 pellets |
| 12 (a, b, c) | 2¾ | 3¾ | — | 00 Buck—9 pellets |
| 12 (a, b, c) | 2¾ | 3¾ | — | 0 Buck—12 pellets |
| 12 (a, b, c) | 2¾ | 3¾ | — | 1 Buck—16 pellets |
| 12 (a, b, c) | 2¾ | 3¾ | — | 4 Buck—27 pellets |
| 16 (a, b, c) | 2¾ | 3 | — | 1 Buck—12 pellets |
| 20 (a, b, c) | 2¾ | 2¾ | — | 3 Buck—20 pellets |
| Rifled Slugs | | | | |
| 12 (a, b, c, d) . . | 2¾ | 3¾ | 1 | Slug |
| 16 (a, b, c) | 2¾ | 3 | ⅞ | Slug |
| 20 (a, b, c) | 2¾ | 2¾ | ⅞ | Slug |
| .410 (a, b, c) | 2½ | Max | ½ | Slug |

W-W 410, 28- and 10-ga. Magnum shells available in paper cases only, as are their scatter and target loads; their skeet and trap loads come in both plastic and paper.

RP shells are all of plastic with Power Piston wads except: 12 ga. scatter loads have Post Wad; all 10 ga., .410-3" and rifled slug loads have standard wad columns.

Federal magnum, range, buckshot, slug and all .410 loads are made in plastic only. Field loads are available in both paper and plastic.

Eley shotshells are of plastic-coated paper.

1—These loads available from W-W with Lubaloy shot at higher price.

Shot Size and Number of Pellets per Load

The table shows the comparative size of different shot and the average number of pellets per load. The actual number of pellets will differ slightly from one manufacturer to another.

Shot Size Considerations

Shot size is important in hunting, for the larger the shot, the farther its effective killing range. Killing power depends not only on shot size, however, but on the number of pellets that hit the game and on velocity and penetration. In fact, shocking power increases in direct ratio to the square of the number of pellets that hit, regardless of size. Thus, four pellets striking home have sixteen times the shocking power of one. From this point of view, there is an advantage of using small shot at close ranges, so the pattern is denser and the number of pellets striking the target is at a maximum. If No. 2 shot is used as a basis for comparison,

There are 50 percent more No. 4's than 2's in an ounce.

There are 89 percent more No. 5's than 2's in an ounce.

There are 150 percent more No. 6's than 2's in an ounce.

There are 289 percent more No. 7½'s than 2's in an ounce.

If No. 4 shot is used as a basis for comparison,

There are 26 percent more No. 5's than 4's in an ounce.

There are 67 percent more No. 6's than 4's in an ounce.

Recommended Shot Sizes and Ranges for Different Game

| Bird | Average Weight | Average Max. Range | Average Shot Size |
|------------------------------|-----------------|--------------------|-------------------|
| Woodcock | 4 to 7 oz. | Under 35 yds. | 9 to 7½ |
| Jacksnipe | 4 to 7 oz. | Under 35 yds. | 9 to 7½ |
| Bobwhite Quail | 4 to 6 oz. | Under 35 yds. | 9 to 7½ |
| Valley or Calif. Quail | 4 to 7 oz. | Up to 35 yds. | 8 to 7½ |
| Gambel's Quail | 4 to 7 oz. | Up to 35 yds. | 8 to 7½ |
| Mearn's Quail | 4 to 7 oz. | Up to 35 yds. | 8 to 7½ |
| Scaled Quail | 7½ oz. | Under 40 yds. | 8 to 7½ |
| Mountain Quail | 9 to 16 oz. | Under 40 yds. | 8 to 7½ |
| Hungarian Partridge | 12 to 13 oz. | Under 40 yds. | 8 to 7½ |
| Doves | 3 to 4 oz. | Under 40 yds. | 8 to 6 |
| Ptarmigan | 12 to 20 oz. | Under 40 yds. | 7½ to 6 |
| Franklin's and Spruce Grouse | 12 to 24 oz. | Under 40 yds. | 7½ to 6 |
| Chukar Partridge | 18 to 20 oz. | Under 40 yds. | 7½ to 6 |
| Small Ducks | 12 to 21 oz. | Up to 40 yds. | 7½ to 6 |
| Squirrels | 1 lb. | Up to 40 yds. | 7½ to 6 |
| Ruffed Grouse | 1 to 1¾ lbs. | Up to 45 yds. | 7½ to 6 |
| Cottontail Rabbit | 2 lbs. | Up to 45 yds. | 7½ to 6 |
| Pinnated Grouse | 1½ to 2 lbs. | Under 50 yds. | 6 to 5 |
| Sharp-tailed Grouse | 2 lbs. | Under 50 yds. | 6 to 5 |
| Large Ducks | 2 lbs. and over | Up to 50 yds. | 6 to 4 |
| Pheasants | 2½ to 3 lbs. | Up to 50 yds. | 6 to 4 |
| Snowshoe Rabbit | 2½ to 3½ lbs. | Up to 50 yds. | 6 to 4 |
| Blue Grouse | Up to 4 lbs. | Under 55 yds. | 5 to 4 |
| Small Geese | 5 lbs. 5 oz. | Up to 55 yds. | 4 to 2 |
| Sage Grouse | 5 to 8 lbs. | Under 60 yds. | 4 to 2 |
| Large Canada Geese | 8 lbs. 4 oz. | Up to 60 yds. | 2 to BB |
| Wild Turkey | 12 to 15 lbs. | Up to 60 yds. | 4 to BB |
| Deer | | Up to 60 yds. | 0 to 00 BB |
| | | | Buckshot |
| Deer | | Up to 100 yds. | Rifled Slug |

Since it is generally agreed that it takes four or five pellets to kill a large duck or pheasant, the hunter needs to use small enough shot at close ranges so that the pattern will be dense enough to assure that enough pellets penetrate the bird at these ranges. Obviously, the larger the bird, the larger the shot can be and still get the required minimum of four to five pellets into the body.

At longer ranges, however, small shot begins to scatter, and those remaining in the pattern lose their velocity quickly. Therefore, as ranges increase, the hunter needs to use larger and larger shot. At far ranges, only the larger shot maintains enough striking power to kill the game. Deciding what size shot to use, therefore, is a fairly complicated process. The table gives recommended shot sizes for different game. Select the smaller sizes for the closest ranges and the larger sizes for the longest, within the range of shot size suggested for each type of game.

Shotshell Ballistics

Shotshell Ballistics and Their Use

The table summarizes the muzzle velocities of four of the most popular shot sizes in each of four gauges. This data relates to the most powerful high-velocity shells made by Winchester-Western, Remington-Peters, and Federal. The table also summarizes the ballistic behavior of BB, No. 2, 4, and 6 size shot at 40 yards when fired at each of the five

Muzzle Velocities and Ballistic Behavior at 40 Yards of Four Sizes of Shot

| Gauge | Shell Length | Drams Powder | Ounces Shot | Shot Size | Muzzle Vel. (FPS) |
|-------|---------------------|-----------------|-----------------|-----------|-------------------|
| 10 | 2 $\frac{7}{8}$ | 4 $\frac{3}{4}$ | 1 $\frac{5}{8}$ | BB, 2, 4 | 1,330 |
| 12 | 2 $\frac{3}{4}$ | 3 $\frac{3}{4}$ | 1 $\frac{1}{4}$ | 2, 4, 6 | 1,330 |
| 12 | 2 $\frac{3}{4}$ Mag | 4 | 1 $\frac{1}{2}$ | 2, 4, 6 | 1,315 |
| 12 | 3 Mag | 4 | 1 $\frac{3}{8}$ | 2, 4, 6 | 1,315 |
| 12 | 3 Mag | 4 $\frac{1}{4}$ | 1 $\frac{5}{8}$ | 2, 4, 6 | 1,315 |
| 16 | 2 $\frac{9}{16}$ | 3 | 1 $\frac{1}{8}$ | 2, 4, 6 | 1,240 |
| 16 | 2 $\frac{3}{4}$ | 3 $\frac{1}{4}$ | 1 $\frac{1}{8}$ | 2, 4, 6 | 1,295 |
| 16 | 2 $\frac{3}{4}$ Mag | 3 $\frac{1}{2}$ | 1 $\frac{1}{4}$ | 2, 4, 6 | 1,295 |
| 20 | 2 $\frac{3}{4}$ | 2 $\frac{3}{4}$ | 1 | 2, 4, 6 | 1,220 |
| 20 | 2 $\frac{3}{4}$ Mag | 3 | 1 $\frac{1}{8}$ | 2, 4, 6 | 1,220 |

At each of these five velocities, here is how each of the three shot sizes will perform in flight:

| Shot Size | Muzzle Velocity | Velocity (FPS) 40 yds. | Pellet Energy 40 yds. in Ft.-lbs. (Each pellet) | Drop in Inches 40 yds. |
|-----------|-----------------|------------------------|-------------------------------------------------|------------------------|
| BB | 1,330 | 915 | 16.27 | 2.4 |
| 2 | 1,330 | 860 | 7.98 | 2.6 |
| 4 | 1,330 | 815 | 4.77 | 2.7 |
| 2 | 1,315 | 855 | 7.86 | 2.6 |
| 4 | 1,315 | 810 | 4.71 | 2.8 |
| 6 | 1,315 | 760 | 2.47 | 3 |
| 2 | 1,295 | 845 | 7.71 | 2.6 |
| 4 | 1,295 | 800 | 4.62 | 2.8 |
| 6 | 1,295 | 750 | 2.43 | 3.1 |
| 2 | 1,240 | 820 | 7.28 | 2.8 |
| 4 | 1,240 | 780 | 4.38 | 3 |
| 6 | 1,240 | 730 | 2.30 | 3.3 |
| 2 | 1,220 | 815 | 7.13 | 2.9 |
| 4 | 1,220 | 775 | 4.29 | 3.1 |
| 6 | 1,220 | 725 | 2.26 | 3.6 |

muzzle velocities mentioned. The larger the pellets, the more they retain their velocity and energy at 40 yards range. Also, the larger the gauge, the greater the velocity at which the pellets are delivered. And since the larger gauges throw larger shot charges, the energy they deliver is correspondingly greater.

To find the foot-pounds of energy delivered by a particular shot charge at 40 yards, multiply the number of pellets in the shotshell by the foot-pounds of energy per pellet (from the previous table). For example, assume you are shooting a 12-gauge gun whose 2¾" magnum shell is loaded with 1½ ounces of No. 6 shot. How much energy is delivered at 40 yards? From the table in a previous section entitled "Shot Size and Number of Pellets per Load," you find that the total number of pellets in this shell is 337. Thus, the energy = $337 \text{ pellets} \times 2.47 \text{ foot-pounds per pellet} = 832 \text{ foot-pounds}$. If No. 2 shot is used in this load, the number of pellets is 135. The energy delivered = $135 \times 7.86 = 1,061 \text{ foot-pounds}$. If No. 4 shot is used, the number of pellets is 203. The energy delivered = $203 \times 4.71 = 956.13 \text{ foot-pounds}$.

All this energy could not be transmitted to the target unless every pellet hit home. The actual energy delivered is found by multiplying the number of pellets striking the target times the foot-pounds of energy per pellet. Thus, if four No. 6 pellets of this charge hit a bird, the actual energy delivered is $2.47 \times 4 = 9.88 \text{ foot-pounds}$. If only one No. 2 pellet hits a bird, the actual energy delivered is 7.86.

Whether or not one or more pellets hit vital spots is also important in determining whether the bird is downed or not.

Thus, as mentioned in a previous section, the decision regarding what shot size to use is hard, because it depends upon how many pellets will hit vital spots of the game at a particular range and with how much foot-pounds of energy. It is obvious from the calculations at 40 yards that each No. 2 shot delivers considerably more foot-pounds of energy at that range than does either No. 4 or No. 6 shot, so only if there are significantly more pellets of smaller size hitting the target will the smaller shot be a better choice. Also, whether more pellets will actually hit depends not only on the range and shot charge, but on the choke and pattern of the particular gun. It is helpful, therefore, for the shooter to know: (1) how his gun patterns at different ranges (a 50 percent pattern at any range is considered minimum for effective killing power), (2) the loads and ballistics of the shotshells he uses, and (3) the estimated ranges at which he proposes to shoot. Knowing these things, he has a fairly good idea about the shot sizes to use on different game at various ranges. If in doubt, he should make life size silhouettes of his game, shoot at them at various ranges and with different shot charges, count the pellets hitting the game, and figure out which charges seem to be best for different ranges. He should keep in mind that for large birds like ducks, more and larger pellets are needed to penetrate for effective killing power.

Ballistic and Trajectory Data: Rifled Slugs

| Gauge | Shell Length | Slug Wt. Oz. | Velocity in fps at | | | | |
|-------|--------------|--------------|--------------------|---------|---------|---------|----------|
| | | | Muzzle | 25 Yds. | 50 Yds. | 75 Yds. | 100 Yds. |
| 12 | 2¾ | 1 | 1,600 | 1,365 | 1,175 | 1,040 | 950 |
| 16 | 2¾ | 7/8 | 1,600 | 1,365 | 1,175 | 1,040 | 950 |
| 20 | 2¾ | 5/8 | 1,600 | 1,365 | 1,175 | 1,040 | 950 |
| 28 | 2¾ | ½ | 1,600 | 1,365 | 1,175 | 1,040 | 950 |
| .410 | 2½ | ⅓ | 1,830 | 1,560 | 1,335 | 1,150 | 1,025 |

| Gauge | Shell Length | Wt. Oz. | Drop in inches at | | | |
|-------|--------------|---------|-------------------|---------|---------|----------|
| | | | 25 Yds. | 50 Yds. | 75 Yds. | 100 Yds. |
| 12 | 2¾ | 1 | .5 | 2.1 | 5.3 | 10.4 |
| 16 | 2¾ | 7/8 | .5 | 2.1 | 5.3 | 10.4 |
| 20 | 2¾ | 5/8 | .5 | 2.1 | 5.3 | 10.4 |
| 28 | 2¾ | ½ | .5 | 2.1 | 5.3 | 10.4 |
| .410 | 2½ | ⅓ | .4 | 1.6 | 4.1 | 8.2 |

| Energy in ft.-lbs. at | | | | |
|-----------------------|------------|------------|------------|-------------|
| Muzzle | 25 Yds. | 50 Yds. | 75 Yds. | 100 Yds. |
| 2,485 | 1,810 | 1,350 | 1,040 | 875 |
| 2,175 | 1,585 | 1,175 | 920 | 765 |
| 1,555 | 1,130 | 840 | 655 | 550 |
| 1,245 | 905 | 670 | 525 | 440 |
| 650 | 475 | 345 | 255 | 205 |

| Midrange Trajectory in In. for a Range of | | | | |
|----------------------------------------------|------------|------------|-------------|----------------------|
| 25 Yds. | 50 Yds. | 75 Yds. | 100 Yds. | Barrel Length In. |
| .1 | .6 | 1.5 | 3.1 | 30 |
| .1 | .6 | 1.5 | 3.1 | 28 |
| .1 | .6 | 1.5 | 3.1 | 26 |
| .1 | .6 | 1.5 | 3.1 | 26 |
| .1 | .4 | 1.2 | 2.5 | 26 |

Ballistic and Trajectory Data: Buckshot

| Gauge | Shell Length | Size | No. of Pellets | Muzzle | Velocity in fps at | | |
|-------|------------------|------|----------------|--------|--------------------|---------|---------|
| | | | | | 10 Yds. | 20 Yds. | 30 Yds. |
| 12 | 2¾ | 00 | 9 | 1,325 | 1,220 | 1,135 | 1,070 |
| 12 | 2¾ | 00 | 12 | 1,325 | 1,220 | 1,135 | 1,070 |
| 12 | 3 | 00 | 15 | 1,250 | 1,160 | 1,085 | 1,030 |
| 12 | 2¾ | 0 | 12 | 1,300 | 1,200 | 1,120 | 1,055 |
| 12 | 2¾ | 1 | 16 | 1,250 | 1,135 | 1,050 | 990 |
| 12 | 2¾ | 4 | 27 | 1,325 | 1,195 | 1,095 | 1,020 |
| 16 | 2⅞ ₁₆ | 1 | 12 | 1,225 | 1,115 | 1,040 | 975 |
| or | 2¾ | | | | | | |
| 20 | 2½ | 3 | 20 | 1,200 | 1,100 | 1,025 | 970 |
| or | 2¾ | | | | | | |

| Gauge | Shell Length | Size | No. of Pellets | Drop in Inches at | | |
|-------|------------------|------|----------------|-------------------|---------|---------|
| | | | | 10 Yds. | 20 Yds. | 30 Yds. |
| 12 | 2¾ | 00 | 9 | .1 | .4 | 1.0 |
| 12 | 2¾ | 00 | 12 | .1 | .4 | 1.0 |
| 12 | 3 | 00 | 15 | .1 | .5 | 1.2 |
| 12 | 2¾ | 0 | 12 | .1 | .5 | 1.1 |
| 12 | 2¾ | 1 | 16 | .2 | .7 | 1.7 |
| 12 | 2¾ | 4 | 27 | .1 | .5 | 1.1 |
| 16 | 2⅞ ₁₆ | 1 | 12 | .2 | .7 | 1.8 |
| or | 2¾ | | | | | |
| 20 | 2½ | 3 | 20 | .1 | .5 | 1.3 |
| or | 2¾ | | | | | |

| Energy in ft.-lbs. per pellet at | | | | | | | | | |
|----------------------------------|------------|------------|--------|------------|------------|------------|------------|------------|------------|
| 40 Yds. | 50 Yds. | 60 Yds. | Muzzle | 10 Yds. | 20 Yds. | 30 Yds. | 40 Yds. | 50 Yds. | 60 Yds. |
| 1,015 | 970 | 930 | 210 | 180 | 155 | 135 | 125 | 110 | 105 |
| 1,015 | 970 | 930 | 210 | 180 | 155 | 135 | 125 | 110 | 105 |
| 985 | 940 | 900 | 185 | 160 | 140 | 125 | 115 | 105 | 95 |
| 1,005 | 960 | 915 | 185 | 160 | 135 | 120 | 110 | 100 | 90 |
| 935 | 885 | 835 | 140 | 115 | 100 | 90 | 80 | 70 | 65 |
| 960 | 905 | 860 | 80 | 65 | 55 | 50 | 45 | 40 | 35 |
| 925 | 875 | 830 | 135 | 110 | 95 | 85 | 75 | 70 | 60 |
| 915 | 870 | 825 | 75 | 65 | 55 | 50 | 45 | 40 | 35 |

| Drop in Inches at | | | | |
|-------------------|------------|------------|----------------------|-------|
| 40 Yds. | 50 Yds. | 60 Yds. | Barrel Length In. | Choke |
| 2.0 | 3.2 | 4.8 | 30 | Full |
| 2.0 | 3.2 | 4.8 | 30 | Full |
| 2.2 | 3.5 | 5.2 | 30 | Full |
| 2.0 | 3.3 | 4.9 | 30 | Full |
| 3.2 | 5.2 | 7.8 | 30 | Full |
| 2.1 | 3.4 | 5.1 | 30 | Full |
| 3.3 | 5.4 | 8.0 | 28 | Full |
| 2.4 | 3.9 | 5.9 | 26 | Full |

Range and Aiming

Estimating Game Range

For all hunters, learning to estimate ranges is an important prerequisite for successful shooting. Any person can shoot at game, flying or running, at all ranges, but to shoot at ranges beyond established maximums is useless, wasteful, and cripples much game. But even if he knows established maximums, he needs to be able to judge when that maximum is reached, so that he will not fire his gun at game beyond that range.

As indicated in the table, "Recommended Shot Sizes and Ranges for Different Game," the average maximum killing ranges for upland game and waterfowl are 35 to 60 yards. Actually, since not many gunners can hit flying birds consistently at ranges much beyond 45 to 50 yards, up to 50 yards is considered the usual maximum range, provided the choke is sufficiently tight. Of course, a lot of game is killed much closer—20 to 25 yards—so for most situations the hunter should learn to judge distances from about 20 to 50 yards. He should seldom shoot closer than 20 yards, even with open cylinder chokes, since the pattern is so dense and small that the game may either be missed or blown up. With modified and full choke guns, the hunter should wait until his game is at least 25 yards away before firing.

How do you learn to estimate 20-to-50-yard distances? There are three separate problems here: making estimates on land, water, and in the air.

Of the three, estimating on land is the easiest. The best way to make estimates of distances on land is to measure off different distances at 10-yard intervals, from 20 to 50 yards over open ground, through thick grass, and in the woods, and to try to memorize how far these distances are. Look at trees, another hunter, bushes, fence posts, telephone poles, to see how they look at 20, 30, 40, and 50 yards. Practice until you can estimate accurately with a minimum of error. By learning to estimate distances on land, the hunter will be able to tell when a rabbit, pheasant, or other game is within acceptable range for the gun he is using.

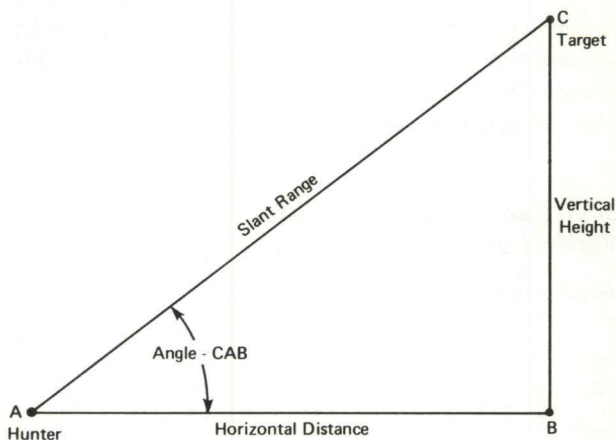
Making estimates over water is a different proposition. It is harder, because there are fewer landmarks to help in judging distance. However, there are several things that help. If you are going to be shooting over decoys, place the decoys within acceptable range and vow not to shoot beyond that range. If you have a lone decoy at a maximum range of 45 yards and the other decoys scattered within that radius, it is easy not to shoot beyond the 45 yards, simply by not shooting at birds outside the radius. If you're hunting a stream or river, know the width of the body of water and estimate killing ranges by making comparisons. Or you can measure ahead of time the distance to a weed bed, stump, rock, the opposite bank of a stream, or other objects above the water. The important point is that a little planning ahead of time will enable you to judge shooting ranges much more accurately.

Estimating distances in the air is the hardest of

all. I have seen hunters fire at geese that were at least 200 yards high, and wonder why they didn't bring them down! Judging distances in the air is easier if there are objects around with which to make comparisons. For example, a 100-foot high tree enables one to visualize just how high 100 feet is. Then observe a duck flying at 100 feet, tree-top level, and learn how it looks. Or look at the heights of various buildings in town, estimating stories at about nine to twelve feet high each. How high is the five-story building? How large do pigeons look sitting or flying around the roof? By repeatedly trying to estimate heights and ranges of different objects, one can begin to become quite expert.

Of course, most shots in the air are not taken right overhead, but at an angle up and across. The hunter is really shooting a certain distance across and another distance up in the air. In the drawing, this slant range is represented as the hypotenuse of a triangle, labeled $A-C$. The horizontal range is $A-B$. The vertical height is $B-C$. The angle between the slant range and horizontal range is angle CAB .

One simple way of figuring the vertical height of an object, such as a tree or building, is to position yourself at A so that angle CAB is 45° . This will occur when the horizontal distance, $A-B$, is equal to the vertical height, $B-C$. Thus, to find the vertical height all you have to do is measure the horizontal distance, $A-B$, and the vertical distance, $B-C$, will be equal to it. (Note: This is true only in the instance given where you have an equilateral triangle



Estimating slant range in the field.

with both legs the same distance and with the angle $CAB\ 45^\circ$.)

Slant range, $A-C$, can be found as the square root of the sum of the squares of the legs of the triangle.

$$\text{Thus, slant range} = \sqrt{(A-B)^2 + (B-C)^2} = A-C$$

If $A-B = 40$ yards and $B-C = 30$ yards,

$$A-C = \sqrt{(40)^2 + (30)^2} = \sqrt{1600 + 900} = \sqrt{2500} = 50 \text{ yards}$$

Of course, no hunter is going to calculate square roots while the ducks are flying, but it is helpful to be able to estimate ahead of time slant ranges by knowing horizontal and vertical distances. The table shows slant ranges in yards with various combinations of vertical and horizontal ranges.

Slant Ranges (in yards)* with Various Vertical and Horizontal Ranges

| Horizontal Range (in yards) | | | | | | | | | | | |
|-----------------------------|----|----|----|----|----|----|----|----|----|----|----|
| Vertical Range (in yards) | | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| | 5 | 7 | 11 | 16 | 21 | 26 | 30 | 35 | 40 | 45 | 50 |
| | 10 | 11 | 14 | 18 | 22 | 27 | 32 | 36 | 41 | 46 | 51 |
| | 15 | 16 | 18 | 22 | 25 | 29 | 34 | 39 | 43 | 47 | 52 |
| | 20 | 21 | 22 | 25 | 28 | 32 | 36 | 40 | 45 | 49 | 54 |
| | 25 | 26 | 27 | 29 | 32 | 35 | 39 | 43 | 47 | 52 | 56 |
| | 30 | 30 | 32 | 34 | 36 | 39 | 42 | 46 | 50 | 54 | 58 |
| | 35 | 35 | 36 | 39 | 40 | 43 | 46 | 50 | 53 | 57 | 61 |
| | 40 | 40 | 41 | 43 | 45 | 47 | 50 | 53 | 57 | 60 | 64 |
| | 45 | 45 | 46 | 47 | 49 | 52 | 54 | 57 | 60 | 67 | 67 |
| | 50 | 50 | 51 | 52 | 54 | 56 | 58 | 61 | 64 | 67 | 71 |

* Total yards have been rounded off to nearest whole number.

Styles of Shooting

There are basically three styles of shooting when firing at birds on the wing: (1) the *fast swing*, (2) the *sustained lead*, and (3) *snap shooting*. In the *fast swing*, the shooter starts his gun muzzle behind the target, moves the muzzle rapidly along the line of flight of the target, past it and in front, firing when experience tells him he is out in front enough.

The important thing is to follow through, to keep the gun moving as it passes the target and is fired. If the shooter stops the muzzle, the time he takes to stop and pull the trigger, and the time the shot takes to travel the distance to the target, will allow the target to move beyond the point where the shooter is aiming. Thus the target will be missed.

It does not matter how fast a bird is going with this method. The faster the bird, the faster the shooter must swing the gun as he pulls ahead and squeezes the trigger. If a bird is crossing slowly, an easy swing will be sufficient to pass it and only a short lead will result by the time he pulls the trigger. If the bird is moving rapidly across, the gun must be whipped past, resulting in a longer lead when the trigger is pulled. This system works regardless of range, as long as the range is reasonable, since moving the muzzle ahead of a bird a few inches will result in many feet of lead at 40 yards but only a foot or so at very close ranges. Thus, the lead is automatically adjusted.

In the *sustained lead*, the gunner starts his swing ahead of the bird, estimates the lead needed, and maintains his lead as he keeps the muzzle moving ahead of the bird along the angle of flight. To be successful with that method, the shooter must be able to estimate the proper lead needed at various ranges and speeds, and to continue to move the gun muzzle ahead of the bird at the necessary distance. This method is most useful with slow, deliberate, pass shooting, whereas the fast swing is more appro-

priate for upland game hunting where the action must be fast.

The third style of shooting is known as *snap shooting*. This style is only useful on nearly stationary targets. With this method, the shooter raises his gun to his shoulder, points it at the bird (which does not appear to be moving), and gets off a quick shot.

Necessary Leads for Various Game Birds

In order to show the necessary leads for various game birds, Captain Charles Askins compiled a list of the speed of these birds with the theoretical and practical leads at 40 yards. The theoretical lead is how far the gun should be pointed in front of the bird so the shot charge can intercept the target. The practical lead will vary, depending upon the angle of flight, the reaction time of the shooter, and the speed of his swing, but in general it is the distance the gunner thinks he is ahead of the bird when the gun goes off.

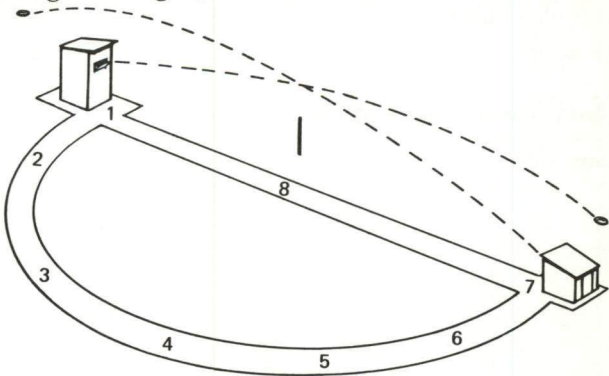
Leads Necessary for Various Game Birds

| Bird | Speed in Feet | | Theoretical | Practical |
|---------------|---------------|---------|-----------------|------------|
| | Per Second | Average | Lead at 40 Yds. | |
| Quail | 60 to 80 | 70 | 8.7 ft. | 4 or 5 ft. |
| Ruffed Grouse | 65 to 80 | 72.5 | 9 | 5 |
| Dove | 70 to 90 | 80 | 9.8 | 5 |
| Mallard | 50 to 90 | 70 | 8.7 | 4 or 5 |
| Canvasback | 90 to 100 | 95 | 11.66 | 6 or 7 |
| Canada goose | 80 to 90 | 85 | 10.4 | 5 to 6 |

Skeet and Trap Shooting

Skeet Shooting

The layout for skeet shooting has two trap houses: the high house, located behind station one, and the low house, located behind station seven. The targets from these houses always follow the same path. Those from the high house emerge at a height of 10'; those from the low house emerge at a height of 3½'. The shooter gets different angles by moving around a semicircle that starts at the high house (station 1), and shooting at seven stations, ending at the low house (station 7). He also shoots at a forward station (8), which is midway between the two trap houses. In skeet shooting, the shooter must fire a single shot at a target from each house from a position in each of eight stations, with a target from the high house always shot first. Then, after firing the singles, he fires doubles from stations 1,



Layout of skeet field.

2, 6, and 7 with the two targets thrown simultaneously. The going away target is shot first and the incoming target second. This makes a total of 24 shots. A twenty-fifth shot is taken immediately following the first target missed, with the shot coming from the same station and house as the one missed. If no misses occur, the shot may be taken from any station, but shooters usually prefer the easy shot from station 7 at the high house target. No. 9 shot is the size preferred by most shooters.

Shooting is conducted with groups of five or fewer persons. Groups are known as squads. Each shooter takes his turn on each station in the order in which he is signed up. Each person in the squad fires a round of 25 shots in the manner already described. Each time a target is needed, the shooter calls "pull" and the target is thrown. The shooter can have the gun mounted before a bird is called for, but it is better practice to bring the gun to the shoulder after calling for the target and at the time you are moving the gun after the target. The gun

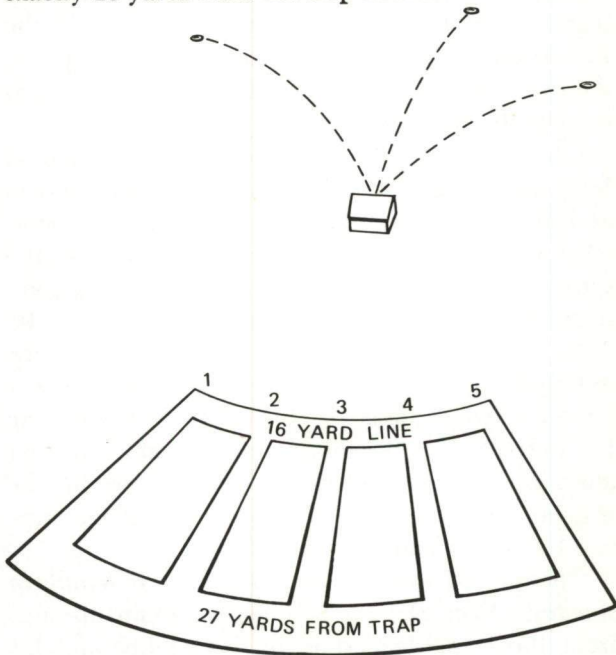
Suggested Leads in Skeet Shooting

| Station | High House | Low House |
|---------|--------------------------------|--------------------------------|
| 1 | Under 6" | 1' |
| 2 | 1' | 1½' |
| 3 | 1½' | 3' |
| 4 | 2½' | 2½' |
| 5 | 3½' | 1½' |
| 6 | 1½' | 1' |
| 7 | 1' | 0' |
| 8 | Blot out target with muzzle | Blot out target with muzzle |

should be moved with the target and past it until the correct lead is reached and the shot fired. The shooter should always continue swinging the gun as the shot is fired; otherwise the shot will go behind the target. The table gives suggested leads at each station for the target from each house.

Trap Shooting

In trap shooting, the gunner fires from five different positions spaced 3 yards apart with each position exactly 16 yards from the trap house.



Layout of trap field.

After each string of five shots, the shooter moves to another station until he has fired from all five positions, thus completing a round.

In ordinary singles shooting, the targets come out of the trap 16 yards from the gun and must go a minimum of 48 yards and not over 52 yards. The targets must be thrown 8' to 12' high, but at an angle and position unknown to the shooter, since each trap moves automatically to the next position. The trap has to be adjusted to throw a normal distribution of angles so that the right angle is not less than straightaway from position one. Ordinarily, the fast shooter will break his birds as close as 30 yards, the slow shooter at 35. Birds allowed to go 40 yards or more are frequently missed.

There are three different events in trap shooting. In *16-yard singles*, shooters are arranged by classes according to their ability. The mechanics of shooting are simple: The shooter takes his place at the station and mounts and aims his gun. At his command of "pull," the bird is electrically tripped. Its flight may vary from straightaway to fairly sharp left and right obliques. Since the shooter never knows at what angle the bird will be thrown, he has to track its path with his gun muzzle, swinging along and beyond the flight path before pressing the trigger. The varying angles provide excellent practice for the upland game hunter.

The second event in trap shooting is *handicap shooting*. Each shooter is given a certain distance from the trap, depending on his ability and his

handicap. The distances vary from 18 to 27 yards. There are no classes in this event. All shooters compete against one another.

The third event is *doubles*. This is quite difficult, since two targets are thrown simultaneously along predetermined, fixed flight paths, with the left and right targets following the path of the extreme left and right 16-yard targets. The shooter knows ahead of time where the first target will be, so he aims at that before calling "pull." After firing at the first target, he must quickly swing to the second target and break it before it hits the ground. This requires fast shooting.

The most usual gun for trap shooting is the 12 gauge. The shells may be loaded with no more than 1½ ounces of shot and 3 drams of powder, with shot no longer than 7½'s. The maximum gauge is 12 gauge.

Shotgun Care

Cleaning Equipment

The following equipment is suggested in cleaning shotguns.

1. Jointed wooden cleaning rod.
2. Brass, copper, or bronze brushes of proper size to use with gauge being cleaned.
3. Felt balls.
4. Jap of proper gauge with serrated tip to screw on the end of the cleaning rod.

5. Cut flannel patches of proper size.
6. Powder solvent such as Hoppe's No. 9.
7. A grease solvent such as cleaning fluid or gasoline.
8. A high-quality gun oil, preferably a good synthetic lubricant such as WD-40, which remains fluid at extremes of cold and hot temperatures. Powdered graphite is also helpful.
9. Small, stiff brushes such as tooth brushes, paint brushes, or electric shaver brushes for cleaning dirt and debris out of action recesses.
10. Soft, clean wiping cloths, plus a silicone-treated cloth.
11. Paste wax or linseed oil for protecting the stock.
12. Assorted screwdrivers and/or pin punches as required for disassembling gun.

Barrel Cleaning

1. Always remove the barrel from the gun before cleaning, so that it can be cleaned from the breech end.
2. Put a clean patch over the felt ball, saturate it with powder solvent, and gently push it through the barrel.
3. Holding the end of the barrel up to the light, rotate the barrel slowly to inspect all the insides of the barrel.
4. If the barrel shows any leading, squirt some solvent into it, attach the wire brush to the cleaning rod, and brush back and forth to loosen the lead.

The sections nearest the breech and muzzle are more likely to show lead deposits than is the center.

5. Saturate another patch with solvent and push through the barrel once more. Inspect the barrel as before to make certain it is clean.

6. After the barrel is free of lead, push a clean patch through it to remove all solvent.

7. Complete the barrel cleaning by pushing an oil-soaked patch through, followed by additional dry patches until the patches come through clean.

8. Wipe the outside of the barrel clean with the silicone-treated cloth. The silicone will leave a protective film to prevent rust.

Cleaning the Shotgun Action

The worst thing the gunner can do is squirt oil into every hole and crevice in his gun. Some oils will congeal or collect dirt, causing parts to malfunction. Oil also rots the stock. It is better, therefore, to use oil sparingly, after all parts are free of dirt.

The first step is to remove all dirt. Use the small brushes to brush out every available part of the action. Use a cleaning or gasoline solvent if there is some grease or dirt that is hard to remove. If there are inside parts such as those associated with the trigger mechanism that the shooter cannot and should not reach, the gun should be taken to a gunsmith at the end of each hunting season, as needed, for a thorough take-down and cleaning of the inside mechanism. A gas-operated automatic should have the gas port and gas cylinder cleared of carbon.

Doubles with hand detachable locks should have the locks removed once a year for a thorough cleaning.

After all dirt is removed, all movable parts should be very lightly oiled (a drop or two is sufficient) and the excess wiped off. If the gunner uses a synthetic oil such as the WD-40 suggested in the list of cleaning equipment, it will not congeal in cold weather as will standard light oils. Moving parts can also be lubricated with powdered graphite, but all excess should be wiped off, leaving only the slightest trace to provide lubrication. The metal surfaces that cover the mechanisms should be wiped clean with the silicone-treated cloth.

Care of the Stock

The stocks of most factory guns are finished with varnish, lacquer, or synthetics, all of which have a tendency to break and chip. If the stock is badly in need of complete refinishing, see the section on "Refinishing the Stock" in Part IV. If the stock needs only to be protected, first wipe it clean to remove dirt, dust, and fingerprints. Then apply a small amount of linseed oil, rubbing it into the stock with the fingers and palm of the hand. Then rub hard with a clean, dry cloth. Or a small amount of paste wax can be used for basic protection of the finish.

If the stock is oil finished, wipe off dirt and rub in a few drops of linseed oil. Wipe off excess oil and polish the stock with a cloth. Scratches can be removed by rubbing oil into them. Be certain all excess oil is wiped off each time and a tough, dry

hard oil finish left on the stock. Also, keep oil out of the checkering, or it will become gummy and dirty looking.

General Care and Storing

Most important, clean the gun each time it is used. It is especially important to wipe it dry to prevent rust and corrosion. Make certain both gun and gun case are dry before putting the gun away in the case. If the gun is to be stored for a long period of time, it should be lightly coated with rust-preventing oil. The best storage is in an upright position in a regular gun cabinet and behind closed doors, but the cabinet should allow free circulation of air at all times. The gun should not be permanently stored in a moisture-collecting sheepskin case, or on a wall gun rack that cradles the gun in a horizontal position. Such a position may warp the stock over a period of time.

Handloading Shotshells

Steps and Stations in Handloading

There are essentially 8 steps in handloading shotshells. As shown in the figure below, these steps are:

1. *Decapping*—pushing out the old primer.
2. *Priming*—replacing the old primer with a new one.
3. *Charging powder*—putting the required amount of powder into the old shell case.

4. *Seating wads*—inserting wads over powder before shot is put in. Wads are used to hold and seal the powder, cushion the shot, and (with the newer types of wads) to enclose the shot column as it passes out the gun barrel so the shot is not deformed by rubbing the sides of the barrel.

5. *Charging shot*—putting the required amount and size of shot into the case.

6. *Crimp starting*—since modern plastic cases do not bend into crimp form easily, the crimping is done in two stages. The crimp is started when fold creases are pressed in the top of the case.

7. *Crimping*—closing the top of the case with a good firm crimp.

8. *Resizing*—resizing the case to its original dimensions.

In order to accomplish these eight steps, the shotshell is moved through five different stations on the handloader, as shown in the drawings.

Station 1—Step 1—Decapping

Station 2—Steps 2, 3—Priming, Charging Powder

Station 3—Steps 4, 5—Seating Wads, Charging Shot

Station 4—Step 6—Crimp Starting

Station 5—Steps 7, 8—Crimping and Sizing

Some inexpensive loaders provide only one station, and all the operations are performed with the shotshell at that one station. This procedure is more time consuming, however, since the eight steps must be accomplished with a large number of changes and adjustments in the reloader as one moves from one step to the other. The most expensive loaders

move the shotshell automatically from one station to the other with a minimum of effort on the part of the operator.

Shotshell Reloaders

There are a number of shotshell reloaders on the market. Among them are those summarized in the table.

Shotshell Reloaders

| Model | Gauge, Shell Lgth. | Case Types | Crimper |
|------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------|
| Honey Bair | All gauges including 12, 20 Mag. and .410; conversion kit to convert from one ga. to another | Paper or plastic without die change | Crimp-easy crimp die requiring 30% less pressure |
| Glacier Bair | Same as Honey Bair | Same as Honey Bair | Crimp starter die. May be converted to 3" by changing crimp die. |
| Polar Bair | 12, 20, 16, 28 ga.; conversion kit to convert from one ga. to another | Paper or plastic | Crimp starter die and crimp die requiring 30% less pressure |
| Lyman 100 SL Shotshell Press | 12 or 20 ga.; conversion kit to change from one ga. to another | High or low brass, 2¾" or 3" without adjustment | Crimp starter and crimp die |

| Powder, Shot Feed | Primer Feed | Wad Feed | Prod. Rate | Features |
|---------------------------------------------------------------------------------------------------|---------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------|
| Interchangeable charge bar bushings, die sets and powder and shot hopper for each ga. | Hand; primer catcher; also with auto. primer feed | | | Large hoppers with built-in shut-off; max. leverage 5 station; shells move through manually |
| Single fore-and-aft charge bar; interchangeable for other gauges | Hand; primer catcher | | Up to 250/hr. | "H" type construction; max. leverage; large capacity-hoppers; 5 stations in line |
| Cam actuated charge bar; interchangeable charge bar bushings and die sets for all ga. except .410 | Auto primer feed and primer tube filler | Swing away wad guide | Up to 600/hr. | Each pull of lever produces 1 reload; case resizing |
| Quick dump reservoirs | Optional primer reservoir; auto primer feed | Wad guide, auto positions itself on case mouth during wad insertion; wad pressure indicator | | Single station press |

Shotshell Reloaders (Cont.)

| Model | Gauge, Shell Lgth. | Case Types | Crimper |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Lyman "Easy" Shotshell Reloader | 12, 16, 20, 28 ga. 10, .410 in roll crimp model. 2½" to 3½"; conversion kit to convert from one ga. to another | Plastic or paper; brass, zinc, Win. AA cases; high or low brass | Adj. to all crimp styles: fold, roll, bend; crimp con- version kit (extra) converts one ga. to another |
| Mec 600 Jr. Plastic Master Mayville Engr. Co. | 10, 12, 16, 28, .410 | Plastic | Spindex crimp starter and cam- actuated crimp- ing station |
| Mec 700 | 12, 16, 20, 28 or .410 | Paper; all brass lengths | Spindex crimp starter and cam activated star crimper |
| Mec 650 and Super 600 | Choice of 12, 16, 20, 28, .410 ga. 2¾" and 3" | Light or heavy plastic; high or low base | Star crimp head, cam operated |

| Powder, Shot Feed | Primer Feed | Wad Feed | Prod. Rate | Features |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------|
| Large capacity reservoirs. Quick change powder and shot bushings. Separate charge bars for powder and shot, or micrometer adj. bars for diff. loads | Hand | | 240/hr. average | Each function completed with a positive stop; 5-station straight-line tool |
| Charging bar and flip-type measure | Hand; primer catcher | Adjusta-Guide wad feed | | Resizing dies and reconditioning at crimping station |
| Procheck programs charge bar and wad guide; flip-type measure | Hand; primer catcher | Adjusta-Guide wad feed | | Finished shells ejected at resizing station |
| Charge sequence automatically maintained; auto. powder and shot charging; 600 lacks charge bar cycling device | Auto. primer feed; primer catcher | Manual wad insertion | | Resize-deprime apparatus; 1 stroke performs 12 operations on 6 shells and gives a completed shell; manual indexing |

Shotshell Reloaders (Cont.)

| Model | Gauge, Shell Lgth. | Case Types | Crimper |
|---------------------------------------|-----------------------------------------------------------------------------------------------------|------------------|-------------------------------------|
| Mec 650 and Super 600 Hydramec. | Same as Mec 650 and Super 600 except electrically driven and with hydraulic system operated by foot | | |
| Pacific DL-155 | Any gauge; conversion kit to change to another ga., also magazine conversion kit | | |
| Pacific DL-366 | Choice of any gauge; die set for conversion to diff. ga.; mag. converter set available | Paper or plastic | |
| Pacific DL-266 | Choice of any gauge; die set for conversion to diff. ga.; magazine converter set available | | 2-way adj. crimper |
| Pacific DL-105 | All gauges; die set for conversion to diff. ga.; magazine conversion set available | | Crimp starter; adj. final crimp die |

| Powder, Shot Feed | Primer Feed | Wad Feed | Prod. Rate | Features |
|-----------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------|
| Same as Mec 650 and Super 600 except electrically driven and with hydraulic system operated by foot | | Operator inserts wad | | Operator inserts shells, wads; everything else finished automatically; 1 shell/stroke |
| Charge bushings for diff. gauges; dual charge bar; large, detachable powder and shot reservoirs | Auto. primer feed (optional) | Wad pressure indicator; wad guide | 200/hr. | 5-station single-post design |
| Shot, powder fed automatically | Auto. primer feed | Manual wad insertion | Up to 600/hr. | 1 completed reload for each stroke of lever; operator inserts shell, wad, and pulls lever; manual indexing |
| Shot and powder assembly removable for load change; different charge bushings | Auto. primer feed actuated by charge bar | Wad guide | | H-type loader, 5 stations in straight line |
| Extra charge bushings avail. (extra) | | Wad guide | 150-200 per hr. | |

Shotshell Reloaders (Cont.)

| Model | Gauge, Shell Lgth. | Case Types | Crimper |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------------|
| Ponsness-Warren Duo-O-Matic 375 | 12, 16, 20, 28, .410 ga.; can be converted from 1 ga. to another with additional tooling; 3" con- version kit available | | Choice of 8 or 6-pt. crimp starters |
| Ponsness-Warren Multi-O-Matic 600 | Every gauge from 12 to .410; addi- tional tooling sets convert 1 ga. to another; 3" conversion kit available | Paper, plastic— 12, 16, 20 ga. Plastic in 28, .410 ga. | Choice of 8 or 6 pt. crimp starters; crimp set to any depth |
| Ponsness-Warren Size-O-Matic 800B | 12, 20, 28, .410 ga. | Paper or plastic | 8 or 6 pt.—12, 20 ga.; 6 pt.—28, .410 ga. Crimp set to any depth |

| Powder, Shot Feed | Primer Feed | Wad Feed | Prod. Rate | Features |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Large shot, powder reservoirs; positive lock on charging ring; shot, powder may be drained out completely; additional shot and powder bushings convert to another ga. | Removable spent primer box | Tipout wad guide | 250 rds. per hr. | Shell stays in resize die through all operations, 5 stations |
| Additional shot and powder bushings to change ga., loads; large shot and powder reservoir; shot and powder may be drained completely | Spent primers collected in container | Cam-operated wad carrier tips out to receive all wads; adj. wad pressure | 500 rds. per hr. | Shell stays in full-length resizing die through all operations; ejected shells drop down chute; cylinder rotates to next station |
| Auto. charges shot, powder; powder bushings changed to change loads; large shot, powder reservoirs | Auto. primer feed; spent primers collected in container | Same as 600 | 700 rds. per hr. 2 people —1200 rds. per hr. 3 people —1800 rds. per hr. | Circular progressive loader; auto. indexing; shell in resizing die during all operations |

Shotshell Reloaders (Cont.)

| Model | Gauge, Shell Lgth. | Case Types | Crimper |
|-------------------------------------------|---------------------------------------------------------------------|---------------|-----------------------------------------------------------------------------|
| Redding Model 16 Shotshell Reloader | 12, 16, 20, 28, and .410 | | |
| Texan M-IV | 12, 16, 20, 28, or .410 ga. Gauge conversion kit available | | 6 or 8 pt. crimp. 6 point only in 28 and .410. Texan tapered crimp |

Tips on Shotshell Loading

Cases. Plastic cases are far superior to paper for handloading. Plastic will not absorb moisture or dry out; it is far stronger and more resistant to abrasion, and is dimensionally more stable. The head usually remains firmly attached to the case body. Plastic cases have a much longer reloading life and provide smoother, more trouble-free gun functioning than do paper cases. They have one disadvantage: they become brittle at Arctic temperatures, so paper cases are still preferred in Arctic areas.

Before starting to load, carefully inspect and sort

| Powder, Shot Feed | Primer Feed | Wad Feed | Prod. Rate | Features |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Integral powder and shot-meas- uring device, alternately feed- ing powder and shot; replaceable bushings for various charges | | Wad pres- sure up to 125 lbs. | | 5 stations; twin-post type |
| | Auto. primer feed | Wad is placed man- ually in wad guide; adj. wad pres- sure | | Empty case and wad in- serted, han- dle pulled, completed shotshell ejected for each pull; self-index- ing, com- pletely automated |

out your cases. Separate them by length, since 3" magnums require a separate operation. Also sort by make and type and by height of base wad. High-base (wad, not metal) cases are used for light target loads; low-base (wads) for heavy field loads. High-base wads take light powder loads; low-base wads take more powder and shot.

Cases should be inspected for condition. Look for bent metal heads (to be rejuvenated later, if possible), loose heads (throw the case away), split, torn, and crushed bodies. Inspect the inside to see if the base wad is present (they are occasionally blown out in firing). If the mouth is torn or

cracked, it will not hold a good crimp and must be discarded or shortened. (Lyman makes a shotshell trimmer.) Soft, paper mouths can be rewaxed. Mushy, plastic mouths can be reformed under heat. Wipe all cases to be used free of water and dirt.

Primers. If the reloader does not have a decapping rod over which the old primer is placed for decapping, so that correct alignment is assured, make sure the decapping pin enters the center of the cup. If it does not, the primer pocket may be enlarged or the base wad torn. Similarly, in inserting a new primer, be certain the priming rod enters without snagging the case mouth and that enough pressure is exerted to seat the primer firmly without bulging the case head inward. If the primer goes in too easily, the pocket is oversized and ought to be discarded.

Charging. Check loading data tables carefully, selecting loads and other components you will need. Remember large bores and light loads need fast powders; small bores and heavy loads need slow powders. Use a powder that is right for your shell. Recheck powder and shot charge bushings to be certain of their measures.

Wads. One decision the shooter will have to make is the type of wad he is going to use. Basically, he can use separate over-powder (O-P) wads, along with filler wads and plastic shot shields to provide a shooting column around the shot so that it does not rub the inner sides of the gun barrel, or he can use the newer plastic single-unit wad columns, which fit over the powder, providing a

cushion and filler between the powder and shot and a shot cup as well. Separate O-P wads have evolved from cardboard to plastic cups. Some shooters still use card wads, and even cut their own. These card wads are perfectly suitable for close-range hunting or fun shooting over a hand trap, but plastic cup wads give superior performance because of better fit. This means a better gas seal, so plastic wads ought to be selected for the best shooting.

As for separate filler wads, they have been made from paper pulp, hair felt, cord, and pressed composition materials of various kinds. Usually, felt and cork give the best results. When using this separate filler wad you can still use a shot-protector shield. Alcon makes a polyethylene shot-strip which is inserted over the filler wad before the shot is poured.

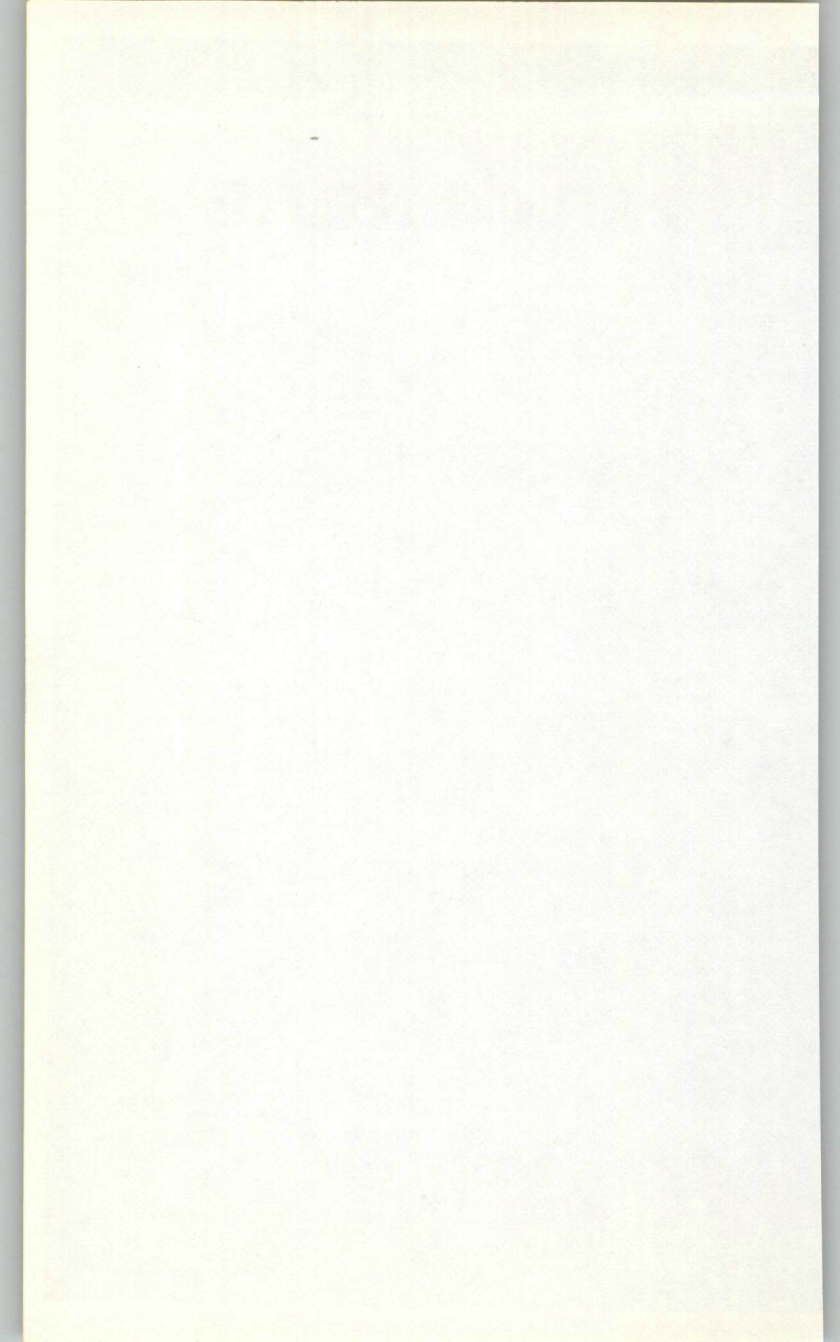
The single-unit plastic wads are now provided in all but the cheapest factory loads. The base forms a cup-type over-powder wad, the middle provides the necessary cushion, and the top a shot-protecting cup. It must be emphasized that these single-unit wads are more expensive than old-style cut wads, and also the reloader must stock several lengths or heights to accommodate different shells and loads. But the single-unit wads are much more convenient to load, and they do provide superior performance.

Crimping. With some older reloaders, you will have to turn the shell case so a crimp fold falls under the index mark facing you. Newer tools provide a self-indexing start die, which automatically rotates to accommodate the location of the crimp

folds. Fired paper cases and new plastic ones always require a separate crimp-starting operation to reestablish the fold locations before the final crimping is done. Fired plastic cases do not always require a crimp-start die, but its use insures better crimping. Paper cases use 6-fold crimps; plastic uses 6- or 8-point crimps. Paper cases that had rolled crimps may be folded crimps if the case is in good condition. The final crimping requires considerable pressure, which could budge the case walls, and that is one reason resizing is accomplished at the same time as the final crimping. A proper crimp is one where the crimp folds meet precisely in the center without a hole or bulge. Some reloaders put a drop or two of melted wax over the crimp center to waterproof the shell. Others stick circular patches over the completed crimp, color-coding the load enclosed.

PART THREE

Handguns and Ammunition



United States Handguns

Types of Handguns and Their Actions

There are three major types of handguns: (1) *single-shot pistols*, (2) *revolvers*, and (3) *semi-automatic pistols*. The *single-shot pistol* is generally used only for plinking and target shooting. It comes in a variety of shapes, sizes, and designs. The most common type has a hinged frame and standing breech. In this type, the barrel is hinged to a forward exterior of the receiver. When the latch is released, the muzzle of the barrel is tipped down to expose the cartridge chamber and to operate the extractor. Single-shot pistols are not often used today.

The *revolver* may be subdivided into two types: the *single-action* and the *double-action revolver*. The *single-action revolver* requires the hammer to be cocked manually for each shot. When the hammer is pulled back, a pawl connected to the foot of the hammer rotates the cylinder so the next loaded cartridge is in position ready to be fired. Generally, this revolver is of solid-frame construction with a fixed cylinder. Fired cases are extracted individually by a rod.

The *double-action revolver* only requires the trigger to be pulled to fire it. Pulling the trigger raises the hammer, rotates the cylinder, and releases the hammer to fire the cartridge. The hammer may be cocked manually (in which case the revolver is being used like a single-action gun), but the double action is the cocking and dropping of the hammer in the one act of pulling the trigger.

Revolvers differ also in the way they are designed for loading or for extracting empty cartridges. The so-called *break frame*, *break-open*, *top-breaking*, *hinged-frame*, *hinged action*, or *tip-up top* is an older design in which the barrel is swung downward to open the revolver. Empty cartridges are pushed out by a star-shaped extractor mounted on a central stem in the cylinder. This type of revolver is used for light sporting purposes but not for target shooting.

The *solid-frame revolver with a swing-out cylinder* is the most common type for both target and hunting use. In this type, the frame is not hinged or jointed, but the cylinder swings out to the side so that empty cartridges can be pushed out by the extractor.

One obsolete type of revolver has a *solid frame with removable cylinder*. In this type, the cylinder is taken out of the frame during unloading or loading. Another obsolete type of revolver has a *solid frame with nonremovable cylinder*. In this type, the cartridges are put into the cylinder one at a time through a loading gate, and the empty cartridges are pushed out one at a time by a ramrod attached to the lower side of the barrel.

Semiautomatic pistols may be divided into two types according to the way the automatic action works: (1) those with *blowback* or *recoil action* and (2) those with *breechblock* or *gas-operated action*. In the *blowback* or *recoil action*, the breechblock is held against the case by a spring. When the pistol is fired, the breechblock is blown to the rear

against the spring tension and ejects the empty case. The spring then moves the breechblock forward, cocking the pistol and picking up a fresh cartridge for the chamber. This type of action is most frequently found in .22 caliber pistols. In the *breechblock* or *gas-operated action*, part of the gas from the exploding shell is channeled off to provide power to work the action. The gas drives a piston that unlocks the breechbolt and pushes it to the rear to eject the case. At this point a compressed recoil spring drives the breechbolt back forward, picking up a new cartridge and chambering it for the next shot. This type of action is most frequently found in semiautomatic pistols of the larger calibers.

Barrels

Barrels of handguns must be designed long enough to deliver maximum velocities, to minimize muzzle blast and noise for the shooter, and to provide a long-enough sight radius for good accuracy. They must also be heavy enough to provide a steady hold for target shooting.

First, maximum velocity requires a long enough barrel. For example, a .41 Magnum cartridge develops a muzzle velocity of 1,500 fps with an 8 $\frac{3}{4}$ " barrel but only 1,250 fps with a 4" barrel. Extra velocity is needed for big-game hunting or for fairly long ranges.

Second, if the barrel is too short, excessive muzzle blast and noise may cause the shooter to flinch, thus destroying accuracy.

Third, the longer the distance between the front

and rear sights, the greater the accuracy in aiming. A long barrel in a handgun allows the maximum sight radius.

Fourth, the barrel must be heavy enough to provide a steady hold for target shooting. Target shooters do not have to carry their guns far, so weight is no handicap. In fact, a heavier gun will hold steadier, so some target guns come equipped with extra-heavy barrels, or with adjustable weights that can be added or taken out to provide the desired balance.

The handgun used for hunting or target shooting should have a barrel length of not less than 6". In hunting models, 6" to 8" is most common; in target handguns, 6" to 9" is usual unless one uses one of the highly specialized target pistols, such as the .45 caliber Colt Gold Cup National Match Pistol, which has a 5" barrel. The tables of handguns on the following pages list only those guns that can be obtained with barrels of adequate length for hunting or target shooting.

Sights

For hunting and/or target shooting, handguns should also be equipped with sights that can be adjusted for both windage and elevation. Most commonly, the front sight is fixed and the rear sight adjustable, although the occasional gun, such as the H&R Sportsman Model 999 revolver, has the front sight adjustable for elevation and the rear for windage. Front sights are usually of blade type, with or without a ramp mount. Some target handguns have

removable, interchangeable blade-front sights. Blades may vary in design, but a square type, Patridge front, $\frac{1}{8}$ " is common. Rear sights may be notch adjusted or micrometer click adjustable. For additional information on sights, see the section on "Iron Sights" in Part I. The handguns described in the tables that follow include only those with adjustable sights. All guns that have both the front and rear sights fixed have been omitted from the list.

Handguns may also be mounted with scopes for hunting. Such scopes have a long eye relief, generally 6" to 17", allowing the shooter to hold the gun well away from his face. Magnification is low, usually 1.3X or 2.5X, which allows a broad field of view. The big advantage of a scope is that it allows the shooter to bring both sights and target into sharp focus, something that becomes more difficult to do with iron sights, particularly as the hunter advances in years.

U.S. Handguns: Single-Action Revolvers, .22 Caliber

| Model | Caliber | Capacity | Barrel |
|-------------------------------------|------------------|----------|----------------------------|
| Colt New Frontier .22 | LR, Mag. | | 4¾", 6", 7½" (buntline) |
| Ruger New Model Super Single-Six | S, L, LR, WMR | 6 shot | 4⅝", 5½", 6½", 9½" |

U.S. Handguns: Single-Action Revolvers, Larger Caliber

| Model | Caliber | Capacity | Barrel |
|------------------------------------------|-------------------------------------|----------|----------------------------|
| Ruger New Model Super Blackhawk | .44 Mag.; also fires .44 Special | 6 shot | 7½" |
| Ruger New Model Blackhawk Revolver | .357 or .41 Mag. | 6 shot | 4⅝", 6½" either caliber |
| Ruger New Model .30 Carbine Blackhawk | .30 carbine | 6 shot | 7½" |

| Length Overall | Weight | Sights | Features |
|----------------------------------------------|-----------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9 $\frac{5}{16}$ " | 30 oz. | Ramp front, adj. | Blue finish, knurled |
| 10 $\frac{9}{16}$ "—Mag. | 31 oz. | rear | hammer spur |
| 12 $\frac{3}{4}$ "—Bunt- line | 28 $\frac{1}{4}$ oz. | | |
| 11 $\frac{7}{8}$ "—6 $\frac{1}{2}$ " bbl. | 32 oz.— 6 $\frac{1}{2}$ " bbl. | Patridge front on ramp, adj. rear | Transfer bar ignition, gate-controlled load- ing, chromemoly steel frame, wide trigger, music wire springs, independent firing pin |

| Length Overall | Weight | Sights | Features |
|----------------------------------------------|---------------|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 13 $\frac{3}{8}$ " | 48 oz. | $\frac{1}{8}$ " ramp front, micro-click adj. rear | Interlocked mecha- nism, nonfluted cyl- inder, square back trigger guard, wide serrated trig., wide spur hammer, deep blue |
| 12 $\frac{1}{4}$ "—6 $\frac{1}{2}$ " bbl. | 40 oz. | $\frac{1}{8}$ " ramp front, micro-click adj. rear | Interlocked mecha- nism, independent firing pin, chrome- moly steel frame, music wire springs, blued |
| 13 $\frac{1}{8}$ " | 44 oz. | $\frac{1}{8}$ " ramp front, Patridge style, adj. rear | Fluted cylinder, round-back trigger guard, independent firing pin, music wire springs |

U.S. Handguns: Single-Action Revolvers, Larger Caliber (Cont.)

| Model | Caliber | Capacity | Barrel |
|------------------------------------------|------------------------------------------------------------------------------|------------------------------------------|----------------------------------------|
| Ruger New Model .357/9mm Blackhawk | Interchangeable cylinders for 9mm Parabellum and .357 Mag. cart. | Same as 357 Magnum except for caliber | |
| Ruger New Model Convertible Blackhawk | .45 Colt or .45 Colt/.45 ACP (extra cylinder) | 6 shot | 4 $\frac{5}{8}$ " or 7 $\frac{1}{2}$ " |
| Smith & Wesson K 38 Single Action | .38 Special | 6 shot | 6", 8 $\frac{3}{8}$ " |

U.S. Handguns: Double-Action Revolvers, .22 Caliber

| Model | Caliber | Capacity | Barrel |
|---------------------------------------------|-------------|----------|-----------------------------------|
| H&R Model 940 Ultra "Side-Kick" Revolver | S, L, or LR | 9 shot | 6" target weight, vent. rib |
| H&R Sportsman Model 999 Revolver | S, L, or LR | 9 shot | 6" top break, vent. rib |
| H&R Model 929 "Side-Kick" | S, L, or LR | 9 shot | 2 $\frac{1}{2}$ ", 4", 6" |

| Length Overall | Weight | Sights | Features |
|----------------------------------------------|-----------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Same as 357 Magnum except for caliber | | | |
| 13 $\frac{1}{8}$ "—7 $\frac{1}{2}$ " bbl. | 40 oz.— 7 $\frac{1}{2}$ " bbl. | $\frac{1}{8}$ " ramp front, micro-click rear adj. for w. & e. | Similar to .44 Mag. regular or converti- ble model; conv. furnished with inter- changeable cyl. for .45 ACP |
| 11 $\frac{1}{8}$ "—6" bbl. | 38 $\frac{1}{2}$ oz.— 6" bbl. | $\frac{1}{8}$ " Patridge front, micro-click rear adj. for w. & e. | S & W blue, checked target type hammer |

| Length Overall | Weight | Sights | Features |
|--------------------|--------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| | 33 oz. | Ramp front, adj. rear | Swing-out, safety rim cylinder, safety lock and key, blue |
| 10 $\frac{1}{2}$ " | 30 oz. | Front adj. for elev., rear for w. | Wide hammer spur, rest for second fin- ger, blue |
| | 26 oz. | Blade front, adj. rear on 4" & 6" models | Swing-out cyl./auto. extractor return; safety rim cyl.; grooved trig. Round- grip frame; blued or nickel (4" only) |

U.S. Handguns: Double-Action Revolvers, .22 Caliber (Cont.)

| Model | Caliber | Capacity | Barrel |
|----------------------------------------|-------------|----------|----------------------------|
| H&R M-949 Forty-Niner | S, L, or LR | 9 shot | 5½" round with ejector rod |
| Iver Johnson Target Model 57A Revolver | S or LR | 8 shot | 4½", 6" |
| Iver Johnson Model 67 Viking Revolver | S, L, LR | 8 shot | 4½" or 6" |
| Iver Johnson Trailsman 66 Revolver | S, L, LR | 8 shot | 6" bbl. only |

U.S. Handguns: Double-Action Revolvers, Larger Caliber

| Model | Caliber | Capacity | Barrel |
|--------------------------------|----------------------------------|----------|---------------------|
| Colt Trooper MK III Revolver | 38 Spec. or 357 Magnum | 6 shot | 4" 6" (357 only) |
| Hi-Std. Sentinel MK II, MK III | 357 or 38 Spec. | 6 shot | 2½", 4", 6" |
| Ruger Security-Six Model 117 | 357 Mag. (also fires 38 Special) | 6 shot | 2¾", 4", or 6" |

| Length Overall | Weight | Sights | Features |
|---------------------------------|-----------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| | 31 oz. | Round blade front, adj. rear | Contoured loading gate; wide hammer spur; single and double action; blue or nickel |
| 10¾"—6" bbl. | 30½ oz.—6" bbl. | Adj. Patridge type | Flash control cylinder, adj. mainspring; blued |
| 9½"—4½" bbl. | 34 oz.—6" bbl. | Adj. Patridge type | Cyl. front recessed for flash control; chambers recessed for cartridge rims. Matted top, wide trig., "Hammer-the-hammer action" |
| Same as M67 except 6" bbl. only | | | |

| Length Overall | Weight | Sights | Features |
|------------------|------------------------|-------------------------------------------------|--------------------------------------------------------------|
| 9¼" | 40 oz.—4" 42 oz.—6" | ⅛" blade with fixed ramp front, adj. notch rear | Grooved trigger, blued or nickel |
| 9" with 4" bbl. | 38 oz.—4" bbl. | Fixed on MK II, adj. rear on MK III | Cylinder latch located in front of cyl., blue |
| 9¼" with 4" bbl. | 35 oz.—4" bbl. | Patridge-type front on ramp; adj. rear | Ejector rod shroud and sighting rib; music wire coil springs |

U.S. Handguns: Double-Action Revolvers, Larger Caliber (Cont.)

| Model | Caliber | Capacity | Barrel |
|--------------------------------------------|----------------------------------|----------|--------------------------------|
| Ruger Stainless Security-Six Model 717 | 357 Mag. (also fires 38 Special) | 6 shot | 2¾", 4", or 6" |
| Smith & Wesson 41 Magnum Model 57 Revolver | 41 Mag. | 6 shot | 4", 6", or 8¾" |
| Smith & Wesson 44 Magnum Model 29 Revolver | 44 Mag., 44 Spec., or 44 Russian | 6 shot | 4", 6½", or 8¾" |
| Smith & Wesson Highway Patrolman Model 28 | 357 Mag. and 38 Spec. | 6 shot | 4", 6" |
| Smith & Wesson 357 Combat Magnum Model 19 | 357 Mag. and 38 Spec. | 6 shot | 2½", 4", 6" |
| Smith & Wesson 357 Mag. M-27 Revolver | 357 Mag. and 38 Spec. | 6 shot | 3½", 5", 6", 8¾" |
| Dan Wesson Model 12 Revolver | 357 Mag. | 6 shot | 2½", 4", or 6" interchangeable |

| Length Overall | Weight | Sights | Features |
|---------------------------|------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| 9¼" with 4" bbl. | 35 oz.—4" bbl. | Patridge-type front, fully adj. rear | All metal parts ex- cept sights stainless steel; black alloy sights |
| 11¾" with 6" bbl. | 48 oz.—6" bbl. | ⅛" red ramp front; micro click rear | Bright blue or nickel; target type stock and hammer; grooved tang and target trig. |
| 11⅞" with 6½" bbl. | 47 oz.— 6½" bbl. 43 oz.—4" bbl. | ⅛" red ramp front; micro click rear | Bright blue or nickel; target type stock and hammer; grooved tang and target trig. |
| 11¼" with 6" bbl. | 44 oz.—6" bbl. | ⅛" Baughman Quick Draw on plain ramp, micro click rear | Grooved tang and trigger; avail. target stock opt.; blued |
| 9½" with 4" bbl. | 35 oz. | ⅛" Baughman on 2½" or 4" bbl.; Patridge on 6" bbl.; micro click rear | Target type stock; grooved tang and trig.; blue or nickel |
| 11¼" with 6" bbl. | 44 oz.—6" bbl. | Any S & W target front, micro click rear | Grooved tang and trig.; blue or nickel |
| 9" with 4" bbl. | 36 oz.—4" bbl. | ⅛" serrated ramp front; adj. rear | Wide (¾") spur hammer; adj. trig.; tools for bbl. and grip changing; satin blue |

U.S. Handguns: Autoloaders, .22 Caliber

| Model | Caliber | Capacity | Barrel |
|--------------------------------------|---------|----------|--------|
| Hi-Std. Sharpshooter Auto. Pistol | .22LR | 9 shot | 5½" |

U.S. Handguns: Autoloaders, Larger Caliber

| Model | Caliber | Capacity | Barrel |
|-----------------------------------|------------------------------------|----------|--------|
| T.D.E. Auto. Mag. Auto. Pistol | 44 Auto. Mag. or 357 Auto. Mag. | 7 shot | 6½" |

U.S. Handguns: Target Revolvers, .22 Caliber

| Model | Caliber | Capacity | Barrel |
|------------------------------------------------------------|---------------------------------------------|----------|-------------|
| Smith & Wesson 1953 Model 35, .22/32 Target Revolver | .22 S, L, or LR | 6 shot | 6" |
| Smith & Wesson .22 Center Fire Magnum M-53 | .22 Jet and .22 S, L, LR with inserts | 6 shot | 4", 6", 8¾" |
| Smith & Wesson Masterpiece Target Models K-22 (M17) | .22LR | 6 shot | 6", 8¾" |
| Smith & Wesson Masterpiece Target Models K-22 (M48) | .22RF Magnum | 6 shot | 4", 6", 8¾" |

| Length Overall | Weight | Sights | Features |
|----------------|--------|-------------------------------------|-----------------------------------------------------------|
| 9" | 45 oz. | Fixed ramp front, square notch rear | Wide, scored trig.; slide lock pushbutton takedown; blued |

| Length Overall | Weight | Sights | Features |
|----------------|-------------------------|-----------------------------------|------------------------------------------------------------------------|
| 11½" | 57 oz.—44 54 oz.—357 | Target type ramp front, adj. rear | Rotary bolt, conversion unit avail. to change caliber; stainless steel |

| Length Overall | Weight | Sights | Features |
|----------------|-----------------|-------------------------------------------------|-----------------------------------------------------|
| 10½" | 25 oz. | ¼" Front Patridge sight, micro click adj. rear | Blued |
| 11¼"—6" bbl. | 40 oz. | ⅜" Baughman Quick Draw front, micro click rear | Blued; target type stock |
| 11⅞" | 38½ oz.—6" bbl. | ⅜" Patridge front sight, micro adj. rear sights | Grooved tang and trigger; swing-out cylinder; blued |
| 11⅞"—6" bbl. | 39 oz.—6" bbl. | Same as M17 Model | |

U.S. Handguns: Target Revolvers, Larger Caliber

| Model | Caliber | Capacity | Barrel |
|------------------------------------------------------------|--------------------------------------------|----------|----------------------------------|
| Colt Python Revolver | 357 Magnum (handles all 38 Specials) | 6 shot | 2½", 4", or 6" with vent. rib |
| Smith & Wesson Masterpiece Target Models, K-32 (M16) | 32 S & W Long | 6 shot | 6" |
| Smith & Wesson Masterpiece Target Models, K-38 (M14) | 38 S & W Special | 6 shot | 6", 8¾" |
| Smith & Wesson 1955 Model 25, 45 Target | .45 ACP and .45 AR | 6 shot | 6½"—heavy target type |

U.S. Handguns: Target Autoloaders, .22 Caliber

| Model | Caliber | Capacity | Barrel |
|----------------------------------------|---------|----------|---------------------------------------|
| Browning 22 Auto. Challenger Pistol | .22 LR | 10 shot | 4½" or 6¾" |
| Browning 22 Auto. Medalist Pistol | .22 LR | 10 shot | 6¾", vent. rib; medium to heavy |

| Length Overall | Weight | Sights | Features |
|-------------------|-----------------|-------------------------------------------------|------------------------------------------------------------------|
| 9¼"—4" bbl. | 41 oz.—4" bbl. | ⅛" ramp front, adj. notch rear | Grooved trigger, swing-out cyl., target hammer; blue or nickeled |
| 11⅞" | 38½ oz. | ⅛" Patridge front sight, micro adj. rear sights | Grooved tang and trigger; swing-out cyl.; blued |
| 11⅞"—6" bbl. | 38½ oz.—6" bbl. | Same as Model K-32 | |
| 11⅞" | 45 oz. | ⅛" Patridge front, micro click rear | Grooved tang and trigger; swing-out cylinder; blued |

| Length Overall | Weight | Sights | Features |
|-------------------|------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| 8⅞"—4½" bbl. | 35 oz.—4½" bbl. | ⅛" blade front, adj. frame mtd. rear | Manual stop-open latch (automatic after last shot); adj. trig.; blue, gold engraved, or chrome plated engraved (choice) |
| 11⅝" | 46 oz. (less weights); forend holds variable weights | ⅛" removable blade front, micrometer adj. rear frame mtd., sight radius 9½" | Left hd. grips avail.; dry-fire mechanism permits practice; adj. trigger; blued, gold engraved, and chrome plated |

U.S. Handguns: Target Autoloaders, .22 Caliber (Cont.)

| Model | Caliber | Capacity | Barrel |
|-----------------------------------------|--------------------------------------------|----------|-------------------------------|
| Browning International Medalist Pistol | .22 LR | 10 shot | 5.9" med. to heavy, vent. rib |
| Colt Woodsman Match Target Auto. Pistol | .22 LR | 10 shot | 4" or 6" |
| Colt Woodsman Sport and Target Model | .22 LR | 10 shot | 4" or 6" |
| Colt Targetsman | Same as Woodsman S & T except 6" bbl. only | | |
| Hi-Standard Supermatic Std. Citation | .22 LR | 10 shot | 5½" bull weight |
| Hi-Std. Supermatic Citation Military | .22 LR | 10 shot | 5½" bull 7¼" fluted |
| Hi-Std. (ISU) Olympic Auto. Pistol | .22 Short | 10 shot | 6¾" |
| Hi-Std. Supermatic Trophy Military | .22 LR | 10 shot | 5½" heavy 7¼" fluted |

| Length Overall | Weight | Sights | Features |
|--------------------------------------------|----------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| 10 $\frac{5}{16}$ " | 42 oz. | Identical to std. Medalist; sight radius 8.6" | Meets all International Shooting Union Regulations; blued |
| 9"—4" bbl. | 30 oz.—4" bbl. 32 oz.—6" bbl. | Ramp front with removable blade; adj. rear | Wide trigger, auto. slide stop; blue only |
| 9"—4" bbl. | 30 oz.—4" bbl. 32 oz.—6" bbl. | Ramp front with removable blade; adj. rear | Wide trigger, auto. slide stop; blue |
| Same as Woodsman S & T except 6" bbl. only | | Fixed blade front sight, economy adj. rear | Without auto. slide stop |
| 10"—5 $\frac{1}{2}$ " bbl. | 42 oz.—5 $\frac{1}{2}$ " bbl. | Undercut ramp front, click adj. square notch rear | Adj. trigger pull, double-acting safety; rebounding firing pin |
| 9 $\frac{3}{4}$ "—5 $\frac{1}{2}$ " bbl. | 46 oz. | Undercut ramp front, frame mounted click adj. rear | Same as regular Citation plus military grip, positive mag. latch |
| 11 $\frac{1}{4}$ " | 40 oz. | Undercut ramp front, click adj. square notch rear | Internal stabilizer with two removable weights; adj. trig.; meets International Shooting Union regulations; blued |
| 9 $\frac{3}{4}$ "—5 $\frac{1}{2}$ " bbl. | 44 $\frac{1}{2}$ oz. | Undercut ramp front, click adj. frame mounted rear | Pos. action mag. latch, adj. trig. |

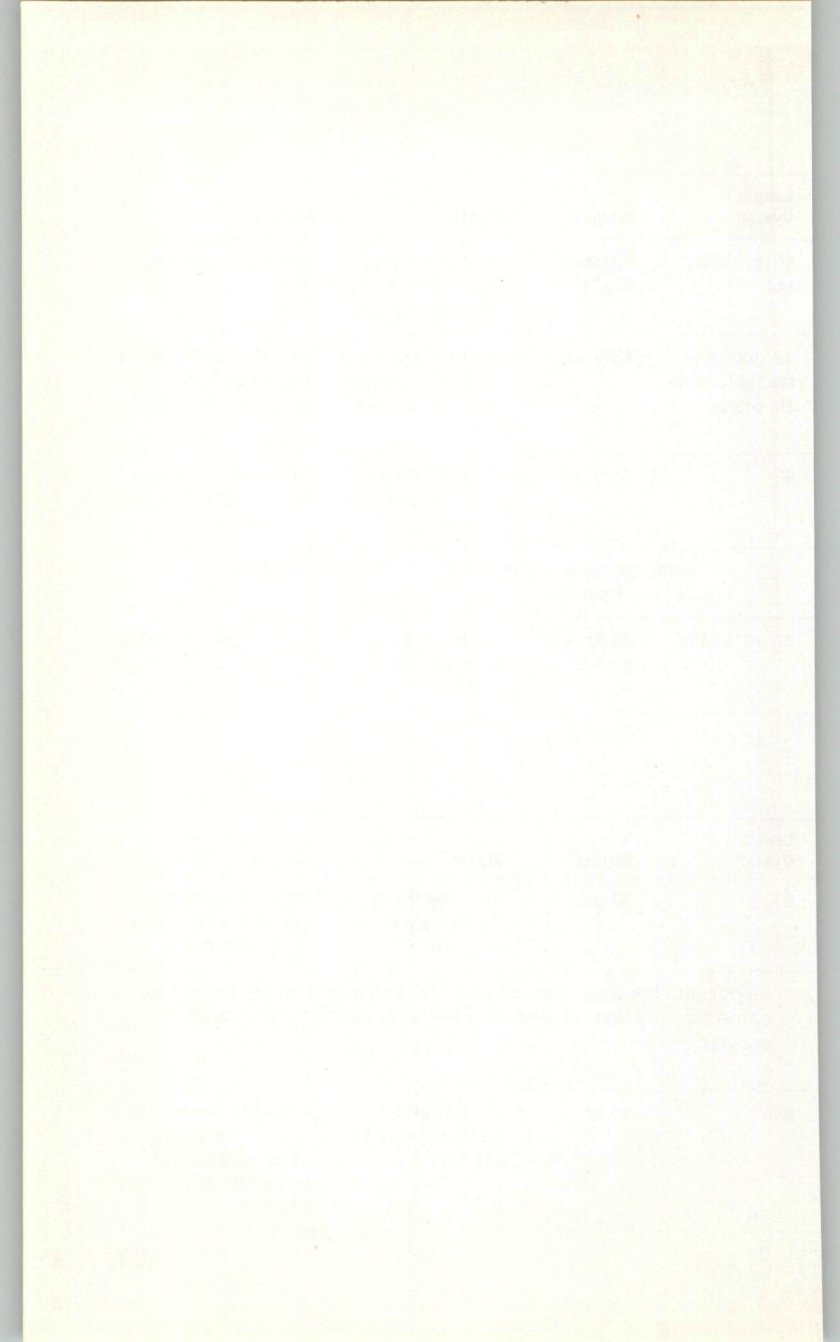
U.S. Handguns: Target Autoloaders, .22 Caliber (Cont.)

| Model | Caliber | Capacity | Barrel |
|-------------------------------------------|-------------------------------------------------------------------------------|--------------------------|----------------------------------------------------|
| Ruger Mark 1 Target Model Auto. Pistol | .22 LR | 9 shot plus 1 in chamber | 6 $\frac{7}{8}$ " or 5 $\frac{1}{2}$ " bull barrel |
| Smith & Wesson 22 Auto. Pistol Model 41 | .22 LR or .22 Short | 10 shot | 5" or 7 $\frac{3}{8}$ " |
| Smith & Wesson 22 Match Heavy Barrel M-41 | .22 LR | 10 shot | 5 $\frac{1}{2}$ " heavy |
| S & W 22 Auto. Heavy Barrel EFS Model 41 | Same as Model 41 Heavy Barrel but with extendible $\frac{1}{8}$ " front sight | | |
| Sterling Model 283 Target | .22 LR | 10 shot | 4 $\frac{1}{2}$ ", 6", 8" |

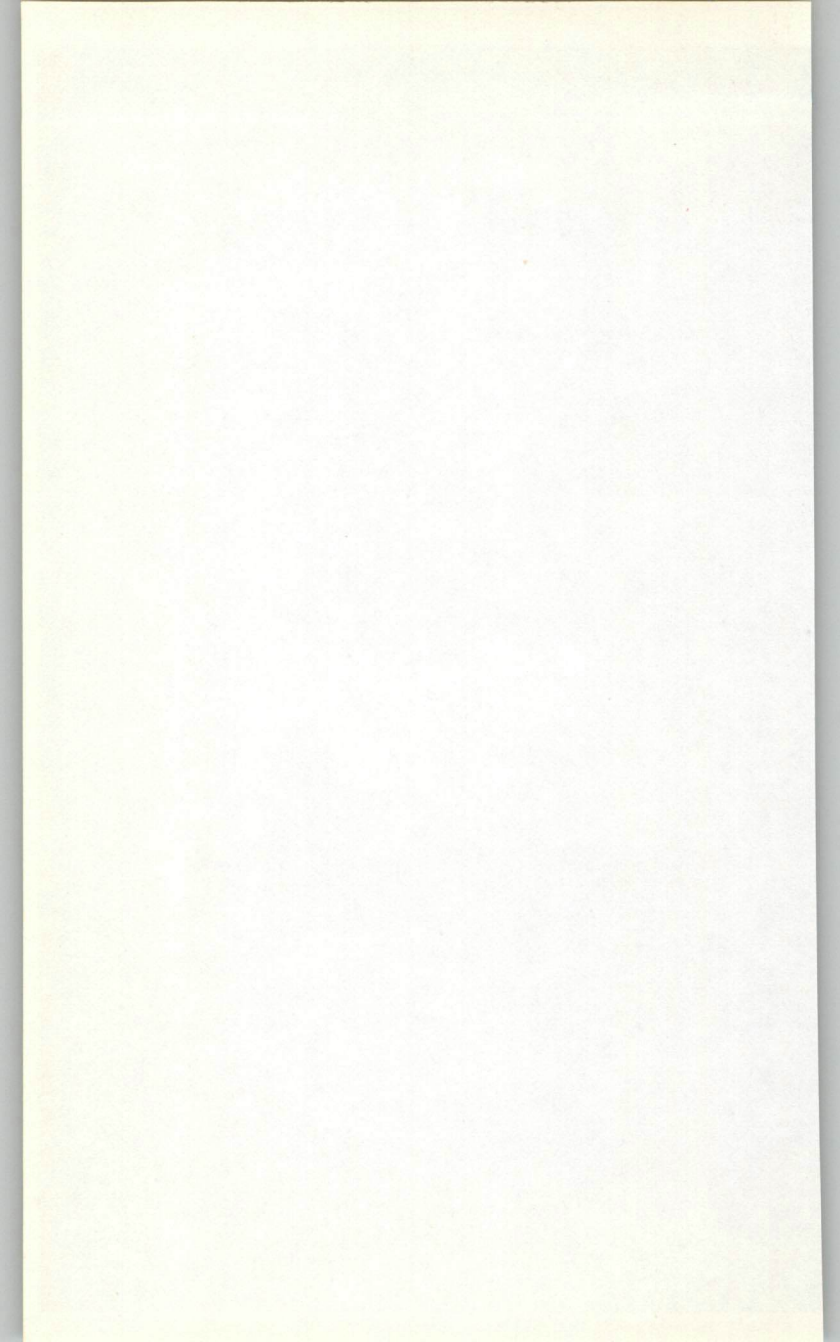
U.S. Handguns: Target Autoloader, Larger Caliber

| Model | Caliber | Capacity | Barrel |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|
| Colt Gold Cup Nat'l Match Auto. | .45 ACP or Wad Cutter; .38 Spec. W.C. | 7 shot | 5" |
| Colt Gold Cup Nat'l Match Mk IV Series 70 Auto. | Identical to the Gold Cup except fitted with a split-finger, collet-type barrel bushing and reverse-taper barrel to match for improved accuracy | | |
| Smith & Wesson .38 Master Model 52 Auto. | .38 Special | 5 shot | 5" |

| Length Overall | Weight | Sights | Features |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 10 $\frac{7}{8}$ "—6 $\frac{7}{8}$ " bbl. | 42 oz.—6 $\frac{7}{8}$ " bbl. | 1 $\frac{1}{8}$ " blade front, micro. click rear; 9 $\frac{3}{8}$ " sight radius | Wide grooved trig.; blued |
| 12" incl. detachable muzzle brake | 43 $\frac{1}{2}$ oz. | 1 $\frac{1}{8}$ " Patridge undercut front sight, micro. click rear adj. | Bright blue; $\frac{3}{8}$ " wide grooved trigger with adj. stop; weights avail. |
| 9" | 44 $\frac{1}{2}$ oz. | 1 $\frac{1}{8}$ " Patridge on ramp base; micro. click rear | $\frac{3}{8}$ " wide grooved trigger; adj. trigger stop; bright blue |
| Same as Model 41 Heavy Barrel but with extendible 1 $\frac{1}{8}$ " front sight | | | |
| 9"—4 $\frac{1}{2}$ " bbl. | 36 oz.—4 $\frac{1}{2}$ " bbl. | 1 $\frac{1}{8}$ " blade front, click adj. square notch rear | Adj. trigger; balance weights; Sear lock safety; blued |
| | | | |
| Length Overall | Weight | Sights | Features |
| 8 $\frac{1}{2}$ " | 37 oz. | Patridge front, Colt-Elliason adj. rear | Wide grooved trigger; adj. stop, ribbed top slide; blued |
| Identical to the Gold Cup except fitted with a split-finger, collet-type barrel bushing and reverse-taper barrel to match for improved accuracy | | | |
| 8 $\frac{5}{8}$ " | 41 oz. | 1 $\frac{1}{8}$ " Patridge front, micro click adj. rear | Locked breech, moving bbl., coin adj. sight screws; dry firing OK with safety on; blued |



PART FOUR
Miscellaneous



Safety Rules

Rifle and Shotgun Handling

1. *Treat each gun as if it were loaded.* Always examine a rifle when you pick it up to be certain if it is empty, but even if you are sure it is, treat it as if it were loaded.

2. *Always keep the muzzle of the gun pointed in a safe direction.* This means in a direction where no person, object, or animal can be accidentally hit.

3. *Always keep the safety on until ready to shoot.* This means release the safety only when pointing at the target or animal and just before firing.

4. *Unload guns when they are not in use.* This means to be certain that all cartridges are out of both chambers and magazine. Never leave a loaded gun in a tent or house or carry one in a car. It is against the law even to have cartridges in the magazine when your gun is in the car. When not in use, take down, or leave actions open. Guns should be carried to shooting areas in cases.

5. *Always open the action of a gun and point the muzzle in a safe direction when passing it to another person or when receiving it from another person.* Do not receive a gun from another person unless the action is open and the muzzle is pointed in a safe direction.

6. *Never point a gun at anyone or anything you do not wish to shoot.* Avoid all horseplay in gun handling.

7. *When loading a gun, keep the muzzle pointing in a safe direction.* This is really an extension of rule 2, but it is to emphasize the importance of

keeping the muzzle pointed safely even while only loading the gun.

8. *Never climb a tree, fence, or wall or jump a ditch with a loaded gun.* Put the gun down and go over or through the obstacle, then let your partner hand you the gun, or reach for it yourself, making certain never to pull the gun toward you by the muzzle. If you have to climb something with your gun, unload it first, then climb.

9. *Be sure of your target before you pull the trigger.* You must positively identify all game before firing and be certain that what you are shooting at is legal and desirable game. The wanton destruction of birds or animals, whether legal game or not, is unsportsmanlike and unforgivable. It is also foolish to shoot at signboards, telephone wire insulators, or other property that deserves to be respected.

10. *Be sure of your backstop.* On the range, a proper backstop will stop the bullet behind the target. In the field, watch for natural objects behind your game that will prevent the bullet from traveling farther than necessary. Never shoot in directions or at objects that are likely to cause the bullet to ricochet dangerously, such as a flat, hard surface or water.

11. *Know your gun and ammunition.* Keep your rifle in clean, operating condition. Be certain you only use ammunition appropriate for your gun, and that you know its range and power. Keep the barrel of your gun free of all obstructions.

12. *Store guns and ammunition in a safe, dry,*

cool place. Preferably, keep all guns and their ammunition under lock and key when not in use.

13. *Avoid alcoholic beverages and drugs before or during shooting.*

Handling Pistols or Revolvers

The following rules are a paraphrase of those used by the armed services in instructing personnel in the safe use of revolvers and pistols. These rules apply to all persons using handguns.

1. *Unload the weapon every time it is picked up for any purpose.* Never trust your memory. Consider every gun as loaded until you have proved otherwise. This first safety rule is the cardinal rule upon which all other safety rules are based. Having made certain that a gun is empty, do not hesitate to look again. Continue to assume that it is loaded even if you, yourself, have unloaded it. If you do this, you will never have an accident and you will automatically obey all other safety rules.

2. *Always unload the gun if it is to be left where someone else may handle it.* This is especially important if there is any possibility that it might be picked up by children or by adults who are not trained to handle firearms properly.

3. *Always point the gun up when snapping it after examination. Keep the hammer fully down when the gun is not loaded.* If the gun is pointed up and a shot is accidentally fired, there is less probability of hurting anyone. It is practically impossible to discharge most firearms when the hammer is fully down, even if they are loaded. In addition, keeping the hammer down relieves the spring from tension and prolongs the life of that part.

4. *Never place the finger within the trigger guard until you intend to fire or to snap for practice.* This reduces the possibility of an accidental discharge.

5. *Never point the gun at anyone you do not intend to shoot, or in a direction where an accidental discharge may do harm.* On the range, do not snap for practice while standing back of the firing line. You may know that your weapon is unloaded, but bystanders do not.

6. (a) *Before loading a revolver, open the cylinder and*

look through the bore to see that it is free from obstruction.

(b) Before loading a semiautomatic pistol, draw back the slide and look through the bore to see that it is free from obstruction.

7. (a) On the range do not load the revolver until the time for firing.

(b) On the range do not insert a loaded magazine in a semiautomatic pistol until the time for firing.

8. Never turn around at the firing point while you hold a loaded pistol or revolver in your hand, because by so doing you may point it at the man firing alongside of you.

9. (a) On the range do not cock the revolver until immediate use is anticipated. If there is any delay, lower the hammer and recock it only when ready to fire.

(b) On the range do not load the semiautomatic pistol with a cartridge in the chamber until immediate use is anticipated. If there is any delay, lock the pistol and only unlock it while extending the arm to fire. Do not lower the hammer on a loaded cartridge; the pistol is much safer cocked and locked.

10. (a) If the revolver fails to fire, open the cylinder and unload if the hammer is down. If the hammer is cocked or partly cocked, a break has occurred. In this case, hold the revolver at the position of raise pistol and announce the fact to the person in charge of the firing line.

(b) If a semiautomatic pistol is jammed, first remove the magazine. Further instruction on this difficulty is given in the rule below.

11. (a) To remove a cartridge not fired from a revolver, open the cylinder and eject the cartridge, first lowering the hammer if it is cocked.

(b) To remove the cartridge not fired from a semiautomatic pistol, first remove the magazine and then extract the cartridge from the chamber by drawing back the slide.

12. (a) While hunting, or in a military campaign, the revolver is carried in the holster fully loaded with the hammer down. The cocked revolver should never be put in the holster whether or not it is loaded.

(b) While hunting, or in a military campaign, when the early use of the semiautomatic pistol is not foreseen, it should be carried with a fully loaded magazine in the socket, chamber empty, hammer down. When early use of the pistol is probable, it should be carried loaded and locked in the holster or hand. In a military campaign, extra magazines should be carried fully loaded.

(c) When the semiautomatic pistol is carried in the holster loaded, cocked, and locked, the butt should be ro-

tated away from the body when drawing the pistol in order to avoid displacing the safety lock.

13. *Safety devices on both revolvers and semiautomatic pistols should be tested frequently.* A safety device is a dangerous device if it does not work properly.

In addition to the foregoing rules, Chapel* lists four additional common sense precautions that should be observed in using handguns.

1. *Know the range and penetrating power of the cartridge you are using and shoot only where the bullet will not hit anything except the target.* For example, the bullet from a .22 Long Rifle cartridge can go through two ordinary doors or the side of an ordinary frame house and still have enough velocity to kill a man. For this reason, it is wrong to hang a target on a door or the side of a house where people whom you cannot see might be hurt or even killed.

2. *Be sure you have a proper target and backstop.* Do not shoot at rocks, bottles, chunks of ice, or other hard-surfaced objects, because the bullets will ricochet (glance off) and may injure or even kill someone you cannot see.

3. *In case of a misfire, which occurs when a cartridge does not fire after being struck by the firing pin, leave the gun closed and keep it pointed down the range toward the target for at least 30 seconds.* It may be a case of a hang-fire, which occurs when a cartridge does not fire at the instant of being struck by the firing pin, but fires later; hence extreme care is necessary.

4. *At a shooting match always carry a revolver with the cylinder swung out and carry a semiautomatic pistol with the slide locked back.*

Binoculars, Field Glasses, and Spotting Scopes

Binocular and Field Glass Construction

In its simplest form a field glass is a small, double telescope with a separate viewing tube and set of

* Charles E. Chapel, *The Art of Shooting*. New York: A. S. Barnes and Co., 1960.

lenses for each eye. Thus, it is really two telescopes mounted side by side. The focus can be adjusted by means of a knob, which moves the lenses in each tube closer together or farther apart.

But a field glass is not a binocular according to modern terminology unless it is made with prisms. In binoculars, two prisms reflect the light in each tube before it reaches the eye. The light enters the binocular through the front magnifying lens, strikes one prism, is reflected forward and strikes another prism, and from there is reflected to the lens or lenses in the eyepiece of the binocular, where the viewer sees it.

The prisms do three things. They turn the reversed image that the magnifying lens brings in right side up. They help make the binoculars smaller than field glasses of the same power, because the light is reflected from one prism to another, not in a straight line. And they allow the magnifying lenses to be set farther apart than the eyepieces to make for better stereoscopic vision at distances. Stereoscopic vision is depth perception, which is achieved because the two eyes see slightly different views owing to the difference in angle at which they look. The farther apart are the objective lenses, the greater the angle of view and the better the depth perception.

The best glasses have *achromatic lenses*, which compensate for the bending of the different light rays. The best also have specially coated lenses to reduce glare and to cut down reflection. There are

two different types of focusing arrangements used. Some have a single central adjustment, so that both lenses adjust with one knob. Others have oculars that adjust individually; these are more suited for persons whose eyes do not test the same. For shooters who wear glasses, special flat eye caps are available. The regular eye caps are unscrewed from the eyepiece and replaced with flat eye caps, allowing the eyeglass wearer to see a full field of view. Or expensive binoculars can be obtained, which have an individual's prescription for corrective lenses included.

In general, it is best to get binoculars of fine quality. Cheap ones have lenses of defective quality, which can cause eyestrain and headaches, particularly if anything is wrong with the alignment of the lenses and prisms.

Binocular Numbers, Relative Brightness

Manufacturers make binoculars in different magnifying powers and with lenses of different diameters. The magnifying power and lens diameter are usually given together, such as 6X, 30; 7X, 35; 7X, 50; or 9X, 35. The magnifying power is given first, so that in a 6X binocular, the object is six times larger than when seen with the naked eye. Also, the object appears at $\frac{1}{6}$ the distance. Thus, the first figure always means power or magnification.

It is possible to check the magnification of your binoculars. Suppose you have bought a pair of glasses that are supposedly 7X. If you want to be certain of their power, set up an object (a 7' length of lum-

ber will do) 100' away. Rest your glasses on something firm, and focus them on the object. Then look at the object, with one eye exposed and the other looking through the tube of the binoculars. The result will be two images side by side. Move the binoculars until the two images overlap. If the smaller object is $\frac{1}{7}$ the size of the larger, you have seven-power magnification.

The second number refers to the diameter of the front, or object lens, in millimeters. The larger the diameter of the objective lens, the greater the light-gathering power of the binocular. Under some circumstances, such as poor light conditions, the brightness of the image is more important than magnification. Therefore, there is some advantage to having a large enough objective lens.

However, as discussed in the sections on "Telescopic Sights" in Part I, there is no point in having an objective lens that is too large, because the eye cannot absorb more than a certain maximum amount of light. (See the previous section under "Telescopic Sights" on "Objective Lens Diameter, Exit Pupil Diameter, and Brightness.") The maximum amount of light the eye can absorb is obtained with a binocular having a relative brightness of 25. Brightness is calculated by dividing the objective lens diameter, in millimeters, by the magnification, and squaring the result. Thus, if a binocular is 7X, 35, the relative brightness is:

$$\text{Relative brightness} = \frac{35}{7} = (5)^2 = 25$$

If a binocular is 7X, 50 the relative brightness is:

$$\text{Relative brightness} = \frac{50}{7} = (7.1)^2 = 50.4$$

Actually, the relative brightness of the 7X, 50 binocular is greater than the eye can handle, so the buyer is spending more money than necessary on an objective lens that is too large. However, the relative brightness of a 9X, 35 binocular is as follows.

$$\text{Relative brightness} = \frac{35}{9} = (3.88)^2 = 15.1$$

Such a binocular is fine under excellent light conditions but inadequate when available light is poor.

Field of View

Another important consideration is selecting a binocular that has a wide enough field of view. It is important to have as wide a field of view as possible, but other things being equal, the greater the magnification, the smaller the field of view. As magnification increases, it becomes harder and harder to locate your game in the more limited field of view. Binoculars of very high power appear extremely unsteady when you are trying to locate an object through them. For target work, spotting scopes are preferred, since the power has to be quite high to locate bullet holes.

Of course, the manufacturer may change internal design and dimensions to increase the magnification and still keep an adequate field of view. Bausch and

Lomb have accomplished this on their 9X binocular, which has the same field of view as does their 7X binocular. The table shows the specifications of their 7X, 35; 9X, 35; and 7X, 50 binoculars.

Bausch and Lomb Binocular Specifications

| | 7X, 35 | 9X, 35 | 7X, 50 |
|-----------------------------|---------|---------|---------|
| Magnification | 7X | 9X | 7X |
| Catalog number center focus | 61-2010 | 61-2030 | 61-2020 |
| Objective diameter | 35mm | 35mm | 50mm |
| Angular field | 7° 17' | 7° 17' | 7° 16' |
| Linear field (1,000 yards) | 382' | 382' | 381' |
| Exit pupil diameter | 5mm | 3.8mm | 7.1mm |
| Relative brightness | 25 | 14.4 | 50.4 |
| Height | 5⅜" | 5⅜" | 7⅞" |

The relative brightness of the 9X, 35 binocular is considerably less than of the 7X, 35, even though the field of view of the two glasses is the same.

If you want to calculate the linear field of view, in feet, of a particular binocular at various distances from the viewer, the following formula can be used.

$$\begin{aligned} &\text{Linear field of view (in feet)} = \\ &\text{Tangent of } \left(\frac{\text{Angular field of view}}{2} \right) \\ &\qquad \qquad \qquad \times \text{Distance (Feet)} \times 2 \end{aligned}$$

Thus, if a binocular has an angular field of view of 7° 17', the linear field of view at 1,000 yards (3,000') is as follows:

Linear field of view =

$$\text{Tangent of } \left(\frac{7^\circ 17'}{2} \right) \times 3,000' \times 2 =$$

$$\text{Tangent of } (3^\circ 38\frac{1}{2}') \times 6,000$$

(From mathematical tables, the tangent of the angle $3^\circ 38\frac{1}{2}' = .06365$.)

$$\text{Linear field of view} = .06365 \times 6,000 = 382'$$

Using the same formula, the linear field of view can be calculated at other distances. Several of the results for the same binocular with an angular field of view of $7^\circ 17'$ are shown in the table.

Linear Field of View at Different Distances of a Binocular with an Angular Field of View of $7^\circ 17'$

| | Distances from Viewer (in feet) | | | | | | | | | | |
|----------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-----|-----|-----|-----|
| | 3,000 | 2,700 | 2,400 | 2,100 | 1,800 | 1,500 | 1,200 | 900 | 600 | 300 | 150 |
| Linear field of view | 382 | 344 | 306 | 267 | 229 | 191 | 153 | 115 | 76 | 38 | 19 |

Selecting a Binocular

Which binocular should the hunter buy? For all-around hunting use, the most popular is the 7X, 35. This provides as much relative brightness as the eye can handle, a seven-power magnification, which is usually adequate for all but the longest-distance big-game hunting, and a large-enough field of view to

insure easy location of the object. The table gives Bausch and Lomb's recommendations for binoculars for different purposes.

Binocular Applications

| Use | 7X, 35 | 9X, 35 | 7X, 50 |
|-----------------------|--------|--------|--------|
| Spectator sports | | | |
| Baseball | A | B | C |
| Football | A | B | C |
| Horse racing | A | B | C |
| Auto racing | A | B | C |
| Track and field | A | B | C |
| All-purpose viewing | A | B | C |
| Long-distance viewing | B | A | C |
| Poor-light viewing | B | C | A |
| Astronomy | B | C | A |
| Surveillance | C | B | A |
| Hunting | | | |
| Woods and heavy brush | A | C | B |
| Open country | B | A | C |
| Mountains | B | A | C |
| Varminting | B | A | C |
| Big game | A | B | C |
| Mountain goats | B | A | C |
| Flying | A | B | C |
| Boating | B | C | A |
| Travel | A | B | C |
| Hiking | A | B | C |
| Theater | A | B | C |
| Bird watching | A | B | C |
| Advanced nature study | B | A | C |

A—First Choice. B—Second Choice. C—Third Choice.

Spotting Scopes

Spotting scopes are usually much more high

power than binoculars, varying in magnification from 9X up to 60X. Some are variable power, allowing the magnification to be adjusted over broad ranges, such as 9X-30X, 15X-30X, 15X-60X, 20X-45X, 20X-60X, 25X-50X, and other combinations. Other scopes are fixed power. Still others have interchangeable eyepieces to give different magnification. Very high power scopes are usually used for spotting shots in target shooting. Some even have right-angle or 45°-angle eyepieces, which allow the target shooter to see his shot simply by turning his head and without any shift in body position. Scopes may also be obtained that are less than 1' in length, with medium or better magnification. These scopes are extremely useful in long-range hunting, such as for sheep, goats, or antelope. Such scopes may be tucked in a knapsack and carried about easily. By glassing from ridges, canyons, basins, or other uneven terrain, the hunter can locate game at far ranges before it has been alerted to his presence. This allows the hunter to stalk game he might otherwise miss.

In contrast to the small spotting scopes, the largest ones may have objective apertures of 100mm and be mounted on heavy tripods. Such large scopes are used primarily for long-range, big-bore matches. Sunshades, dust covers, carrying cases, and other extras can be purchased as optional equipment by the serious target shooter.

Carriers, Storage, and Cabinets

Gun Cases

One of the secrets of keeping your gun looking new is having a proper gun case. The most usual cases are long leather, leatherette, canvas, or plastic cases lined with sheepskin, flannel, or artificial fleece. These are adequate to protect your gun from scratches but will not protect it from hard knocks as will a trunk-type case. Always put your gun in some type of case before you transport it anywhere by auto, truck, boat, plane, and so on. If you are carrying your gun yourself, a fleece-lined case is adequate as long as you are careful not to bang it around, put heavy objects on it, or otherwise abuse it. If you are shipping your gun or checking it on a plane, however, a trunk-type tote case is necessary.

Be certain your gun is dry when you put it in a fleece-lined case and make certain that a case that has been exposed to rain, spray, or other moisture is thoroughly dried after each outing. One disadvantage of such a case is that the fleece retains moisture, and any gun put away damp, or in a damp case, will rust very quickly.

I like the fleece-lined cases of the proper size for the gun, particularly if made of a fairly heavy leatherette or real leather on the outside, with a convenient carrying handle and a zipper that works. Guns with scopes should have cases broad enough to fit right over the scope.

Never store your gun in a fleece-lined case for very long, especially in humid weather. Your gun is better off out in the air, especially if it is in its own rack or in a well-ventilated gun cabinet.

Ammunition Storage

All ammunition is subject to deterioration over a long period of time, particularly if it is not properly stored. Also, some ammunition deteriorates faster than others. During the 1920's, millions of pounds of powder and ammunition left over from World War I had to be destroyed because it deteriorated in storage magazines. During the years following World War II, ordnance inspectors tested samples of stored military ammunition regularly, and when deterioration was discovered the ammunition was condemned and was often dumped into the sea.

The reason for this deterioration was acid, not from outside sources but from within the powder itself. Acid is vital to powder manufacture, yet if all traces are not removed in the final stages of manufacture, powder deteriorates rapidly with age. Therefore, whether or not your ammunition will deteriorate over the years will depend somewhat on its manufacture. The older it is, the more likely it will deteriorate because of residual acid in the powder itself. Therefore, if you have some old World War I surplus ammunition, or some old shells of Grandpa's passed down from World War I days, better think twice before taking them along on that

once-a-year deer hunt. They might not have any more power than your son's BB gun.

Generally speaking, most of the powder manufactured since World War II has been produced by new methods that have eliminated some of the process of deterioration to which older powder was subject. Therefore, this powder does not deteriorate rapidly with age, unless it is subject to adverse environmental conditions.

Two environmental conditions are harmful to all rifle and pistol ammunition and shotshells: (1) excessive heat and (2) moisture. Excessive heat dries out the moisture in the powder itself and changes its characteristics. The wax of paper-case shotshells stored at the critical temperature of above 135° will start to melt and run into the powder, causing a great loss of power. Or the shell may only go "poof" when someone fires it. Alternating heat and cold dries and loosens seals in many types of cartridges, reducing pressures, velocities, and power. Of course, heat can become so excessive that powder and primers will explode, so don't put your box of shells on the top of the wood stove when you come in tired from hunting!

To avoid heat, store ammunition near the floor in rooms, never in attics or near ceilings, or over stoves, radiators, or other sources of excessive heat. Similarly, shells left in closed automobiles or auto trunks, or out in the hot sun, may be subject to far too much heat.

Shells should be kept away from high humidity and excessive moisture. Damp basements will even-

tually destroy the power of ammunition, especially of shells with inadequate moisture-proof seals. Paper-case shotshells are especially subject to deterioration. If the wax is rubbed off of spots on the cases, moisture will be absorbed into the case itself and work its way into the wadding and powder. Not only is power reduced, but the case swells and may not even work in your gun. Plastic shells are much more waterproof, but even they will not keep out moisture indefinitely. I have seen duck hunters leave a box of shells out in the rain and never dry them before storing them in an air-tight container. Such carelessness is asking for trouble. Moisture also has a corrosive effect on metal cartridge cases, so these too should be stored away from dampness.

The rule is: Store your ammunition in a cool, dry place.

The National Association for Fire Prevention recommends that ammunition and/or powder be stored in a wood chest or cabinet, constructed of lumber not less than 1" thick and fitted with a tight lid or door. Wood is preferred over metal since wood prevents heat from being transferred through to the powder in the early stages of fire. If the wood burns and the ammunition ignites, the wood gives way more easily, eliminating the dangerous fragments of shrapnel a metal container would produce.

What about carrying ammunition in your car or boat? Some shooters have specially made wooden ammunition boxes, which serve admirably. I generally use the metal ammunition boxes that can be obtained from war surplus stores. But I keep the

ammunition within these metal boxes in their own cardboard containers until ready to use. The metal boxes are especially waterproof for use in boats, have convenient carrying handles, and are inexpensive. But do not leave them in the hot sun or in a hot, closed-up automobile where temperatures become excessive. If you hunt in hot climates, wooden ammunition boxes make better carriers, primarily because they do not heat up as fast as metal boxes.

I do not like to have loose ammunition rattling around in any kind of carrier. If you do not have the original cardboard carton for your cartridges, drill holes in a block of wood to put rifle or pistol shells in it. Ammunition belts or vests will hold a lot of cartridges or shotshells, and are fine means for transporting your ammunition. After shooting, however, put unused shells away in their storage boxes, and these in drawers or cabinets. Never let shells of any kind lie around loose where children can find them. I once saw a five-year-old boy sitting on the front steps of his house hitting one of his father's shotshells with a hammer! Fortunately, the shell did not explode. Persons have been injured, also, by shells carelessly thrown into trash and burned. Therefore, put your ammunition away, and preferably keep it and your guns under lock and key at all times when not in use.

Gun Stock Alterations

Adding Checkering

Checkering is a series of parallel V grooves cut

to a depth of about $\frac{1}{16}$ " into a stock and crossed at a sharp angle (usually 30° to 45°) by another series of parallel grooves at the same depth. The spaces between these two series of grooves are formed into diamond-like pointed pyramids. Checkering is described by the number of grooves per inch. For example, "20-line checkering" indicates 20 grooves per inch. Generally, if the grooves are spaced closer than 22 to 24 lines per inch, the diamonds are too small to provide a rough gripping surface. If the grooves are fewer than 16 to 18 per inch, however, the checkering is usually too rough for comfortable gun handling. Woods that are too soft or porous cannot take lines closer than 16 to 20 per inch.

The best checkering is done by hand. (The total process will be described in this section.) However, less-expensive commercially made guns frequently have checkering that is pressed into the wood under high heat and pressure. Impressed checkering is generally of the *negative type*; that is, instead of the diamond-shaped pyramids rising above the wood, they are pressed into the wood. However, a new *positive type* of checkering is now being impressed commercially, which more closely approximates the hand-cut checkering found on the finest guns. If done properly, checkering not only enhances the beauty of the stock, but provides a better gripping surface on the forend and pistol grip.

Checkering is a job that requires much time, patience, careful work, and skill, so if you're the type that can't stand tedious work, better let someone else do your checkering for you. However, if

you like tedious, fussy tasks, and have the temperament to work slowly and patiently, you might try checkering for yourself. The following outline gives the basic steps in the process.

Holding the Stock: The Checkering Cradle. The first step in checkering your stock is to provide a way to hold the stock so that you can work on it. By far the best way is to use a checkering cradle. These may be purchased from gun supply houses for prices ranging from \$6 to over \$30.

Necessary Tools. Only a few basic tools are needed: a metal scribe, a border tool, a spacing tool, a V-tool or single cutter, a V-chisel, a flexible ruler, grease pencil, toothbrush, paper for border pattern, and linseed oil or stock oil to darken the checkering to match the rest of the stock.

The Pattern. The first task is to select or design a pattern. Where will the checkering be placed: forend, pistol grip, other parts of the stock? Many patterns, such as those found on the pistol grip of a stock, consist of two sections—one on each side of the grip. These are mirror images of each other. Others, such as those on the forend, consist of one design on the underneath side. There are wide variations in patterns, so you will have to decide on the pattern you want. Patterns can be purchased from gun supply houses but must frequently be modified to fit the individual gun. One way to decide on a pattern is to look at the checkering on a number of guns. If you find a pattern you like, tape a piece of typewriter paper over it and rub the side of a soft pencil against the paper. This will transfer the basic

pattern onto the paper, which in turn can be transferred to the wood of your gun.

After you have a pattern, tape a paper cut out of it to the proper position on your stock. Draw around the outside edges with the grease pencil to form the border lines of the pattern on your stock.

The Border. Trace over the border of the pattern lightly with a sharp metal scribe, making certain you follow the grease pencil line exactly. Then use the V-tool or single cutter to cut a groove at the border where the checkering lines will end, but do not cut this groove too deep. Later, if you decide on a deep, permanent border line, you can trace over the border with the special border tool, but do this after the checkering is complete.

Master Lines. After the border is cut, the next important step is to draw and cut the master lines for the diagonal checkering. These are two basic lines running diagonally across the pattern, intersecting at an angle so the diamonds are about $3\frac{1}{2}$ times longer than they are wide. The flexible plastic ruler can be held against the stock while the lines are drawn, then scribed, and then cut with the V-tool (single cutter).

Spacing Lines. The parallel spacing lines are cut one by one, with each previous line acting as a guide for the succeeding line. Begin by running the spacing tool along each master line. Note that one blade of the spacing tool traces along the master line while the other blade cuts the next groove parallel to the master line. After each line is cut, run the spacing tool blade along that so the other

blade can cut the line next to it. Continue this until all the lines are in along both diagonals. At this stage, the lines are not cut to their full depth, nor are all the diamond pyramids fully formed. The important thing is to cut to about $\frac{1}{2}$ or $\frac{2}{3}$ depth, forming perfectly spaced parallel lines so the pattern is even and the lines do not cross the border lines or nick the outside of the border lines. Use the V-chisel as needed to get into the corners or other hard-to-reach places.

Deepen the Lines to Form Diamond Pyramids. Use the single cutter or V-tool to deepen the lines until the diamonds are no longer flat topped. Deepen first along one set of diagonals, then along the diagonals running across. Usually about two cuts are needed before the lines are cut to their full depth.

Forming the Border. If the border lines are nicked or crossed at all, use the border tool to deepen and widen the border lines until they are cut neatly and deep enough for all nicks to be eliminated. If the initial border lines have not been marked at all, it may not be necessary to use the border tool. Some of the finest checkering has no border lines, but this skill is very difficult for the beginner to achieve. Usually using the border tool gives the job a finished look.

Brush Out All Dust and Wood Fibers. Use the toothbrush to thoroughly clean out all lines.

Finish. Apply linseed oil, TruOil, or some other stock oil so the cuttings are colored the same tone

as the rest of the stock. Apply sparingly, being careful not to fill up the cuts with gummy oil.

Shortening or Lengthening Pull, Adding a Recoil Pad

Installing a recoil pad is warranted if one or more of the following conditions exist:

1. The length of pull of the stock is too long and needs to be shortened. It is sometimes easier to cut the stock down and install a recoil pad than to re-install the original buttplate after the stock is cut off.
2. The length of pull is too short and must be lengthened.
3. The recoil of the gun disturbs the shooter and a pad will help minimize the problem.

The first consideration in installing the recoil pad is to determine at what point and at what angle (pitch) the stock is to be cut off. Therefore, two questions must be answered: (1) What total length of pull does the shooter require, and (2) Is the present pitch of the gun (particularly of a shotgun) satisfactory? Length of pull is discussed in sections of Parts I and II; see those sections for measuring and determining length of pull. After this is done, the thickness of the recoil pad must be taken into consideration. The place at which the stock is to be cut off should be the distance of the length of pull minus the center thickness of the recoil pad.

If the present pitch of your gun is satisfactory, the stock butt should be cut off exactly at the

original angle. Ordinarily, a rifle has no pitch, so the stock is cut at a 90° angle to the line of the barrel. If either the heel or toe is slightly long on a shotgun, the pitch and angle of the butt must be correspondingly altered. (See the sections on Shotgun Stock and Fit in Part II.) Note that if there is a tendency for the butt to slip down so that you are overshooting, the heel is too short and the stock must be cut off more at the toe (to increase the pitch). If the butt is slipping up so that you are undershooting, the toe is too short and the stock must be cut off more at the heel (to decrease the pitch).

If you are not sure of the angle, cut off the butt at the same angle, but $\frac{1}{4}$ " long. Attach the pad temporarily according to the instructions that follow. Then take your gun to a trap range or field and fire it with the pad as is. If you are undershooting or overshooting because the stock tends to slip up or down, try putting a wooden wedge between pad and stock at either the heel or toe as needed. (A wedge about $2\frac{1}{2}$ " long, $1\frac{1}{4}$ " wide, and tapered from 0" to $\frac{1}{8}$ " thick is about right.) Shoot with the wedge in place at either the heel or toe to determine the correction needed. Back in your workshop, draw lines to show which way the angle is to be corrected and to be sure the butt is cut off the right length.

Once the proper stock length and angle are determined, extreme care must be taken to avoid splintering the far sides of the stock with the saw. There are several ways of minimizing this. One, is

to cut the stock $\frac{1}{16}$ " long and then use sandpaper, or a sharp cabinet scraper and files, to reduce to the length wanted and to cut away the splintered edges. Another way to minimize splintering is to use saw blades with only the finest, sharpest teeth. I can do the best job using very fine teeth on a crosscut blade of a table saw. I saw straighter and neater with such a saw also. I cut the stock $\frac{1}{16}$ " long and then sand with a belt sander. If you prefer, you can use a new, sharp, hacksaw blade to cut $\frac{1}{16}$ " long and go on from there. I have far more trouble cutting straight with a hacksaw than with other types of saws. Whatever you do, do not use standard wood saws with coarse teeth; you will splinter your stock edges.

After sawing the stock, locate the pad on the butt, mark, drill, and tap the pad holes in the butt, and attach the pad with screws. If your gun is a take-down type, it is better to remove the barrel and so on before starting to attach the recoil pad. If your gun has a solid frame-type arm, held to the butt by a screw from the back end, you will have to remove the stock, fit the pad, then take off the pad, rescrew the stock to the gun, then reinstall the pad.

After the pad is screwed to the stock, the excess parts of the pad that stick out from the flat sides of the stock must be removed. A belt or disc sander is usually best for this job, since the hard portions of the pad are difficult to cut. But before sanding the pad, wind two layers of masking tape around the bottom portions of the stock to protect the stock finish from the sander. The final sanding must be done carefully, with the masking tape removed from

the stock. If you have marred the stock finish with the sander, refinish or repolish the spots. Minor markings can often be polished out. If the stock is finished with varnish, lacquer, or plastic, touch up the surface finish with one of these. Stock oil or linseed oil can be used to restore the gloss to oil finishes, or even to slightly darken light spots on a stained stock. (If the stock has to be completely refinished, see a subsequent section.)

Cutting Down Comb Height

Sometimes a shooter discovers that a gun does not fit because of the height of the comb. (For a complete discussion of comb height see the sections on "Rifle Stock and Fit" in Part I and on "Shotgun Stock and Fit" in Part II.) A comb of proper height, whether on a rifle or shotgun, should allow the shooter to rest his cheek comfortably on the comb so that his eye is aligned along the proper sighting plane.

The easiest situation to remedy is one in which the comb is too high. The problem is solved by cutting off the top of the comb to the proper height, and reshaping and refinishing the stock. There are three useful tools for cutting down the comb. The first is a plane. Get a so-called smooth plane or bench plane, about 8" or 9" long. The second needed tool is a wood rasp. Get a four-in-hand or shoe rasp. This rasp is really four in one; one side is flat and the other side is partially rounded. Each side has a rough cut at one end and a smooth cut at the other, so there are four different cuts from which to choose. The third tool is sandpaper of different

grits: sizes 120, 220, 280, 320, and 400 will do nicely. (The larger the number, the finer the grit.) A belt sander (which goes straight back and forth, not orbiting) will speed your work along in the early stages, but is not necessary. In using the sander, hold it in a clamp and hold the stock by hand up to it. Never use a disc sander, as any movement across the grain will make noticeable scratches in the wood.

Use the wood rasp to start the cutting, beginning with the flat, roughest end of the rasp first if much is to be taken off. From time to time, hold the stock up to your eye and sight along the top plane to see if any portions are cut more than others. If there are ridges or valleys, use the plane to smooth out the surface before continuing the cutting with your wood rasp, using the flat, smooth surface of the rasp to do the finer finish work and then the plane to smooth that out.

After your comb is cut to a proper height and shape, use varying grades of sandpaper to do the finish work, ending up with the extra fine grit, #320 or #400. Be certain to sand only with the grain of the stock, not against the grain.

One final step is needed before refinishing the stock: your stock must be "dewhiskered." Whiskers in a stock are really ends of wood fibers that break loose from the body of the wood when it is cut down. These loose fiber ends will stick up when the finish is applied, so that the entire stock surface feels like a day's growth of beard. Obviously, the whiskers must be removed. The best way to do this

is to dampen the cut portions of the stock by wiping with a wrung-out but slightly damp sponge. After dampening, hold the stock over the burner of your stove, close enough to evaporate the moisture but without scorching the wood. Move the sanded portion back and forth over the burner until dry. As the water evaporates, the steam raises the splintered fiber ends until they protrude enough to be removed.

The best way to remove the whiskers is with #320 or #400 sandpaper or with fine steel wool. Always move against (but not across) the grain of the wood to cut off the whiskers. If you move with the grain, you will only press the whiskers back down into the wood and have to start the whole process over again.

After removing the whiskers, wet the stock again and repeat the procedure until no whiskers remain. The stock must be sanded completely before any finish is applied. (For directions in applying the finish, see a subsequent section.)

Adding to Comb Height

If the comb of a gun is too low and the shooter does not want to buy a whole new stock, there are two principal methods by which the comb may be built up. The simplest method is to install a laced sleeve. Such a sleeve is best made of leather and padded on top under the leather to provide a comfortable cheek rest for the shooter. Such a sleeve is quite practical for the shooter with a "glass jaw" who objects to the recoil of a high, hard, wooden

comb, but it does detract from the beauty of the gun.

For a shooter who objects to the sleeve, a comb may be built up by gluing another piece of wood to the top and shaping and finishing it to match the rest of the comb as closely as possible. There are a number of steps to this process, and they are outlined here.

1. Select a piece of a kind of wood whose grain matches that of the existing stock as closely as possible. Stocks are most commonly made of walnut or maple.

2. Cut off the top, rounded portion of the comb of your stock so that the surface is flat and broad enough to provide a proper base for the piece you plan to glue on. The broader the base needed, the more you will have to cut down the existing comb. If much is to be cut off, it can be marked, sawed with a table saw that has a blade with very fine teeth, and finished off with a plane. Or all the cutting can be done with the bench plane, removing a little wood at a time and continuing until the surface of the cut is smooth and level. Any dips or waves in the wood can be detected by laying a flat-edge ruler or piece of metal on the planed surface and holding it at eye level against a strong light.

3. After the stock is prepared, plane the gluing surface of the new comb piece until it is also flat and smooth and will fit tightly against the top of the stock. Be certain the new piece is slightly larger than needed to give plenty of wood to work with in shaping the new comb.

4. Glue the new piece to the old stock with epoxy glue. Epoxy comes in two tubes, one with resin and the other with hardener. When the two are properly mixed and applied the result is a bond stronger than the wood around it. Mix the resin and hardener according to directions, stirring until they turn a cream color. Apply the glue to both the prepared surfaces of the stock and to the new comb piece using a small piece of clean wood for an applicator. Press the two glued surfaces together, sliding firmly back and forth to spread the glue evenly, ending with the new piece correctly aligned. Clamps or large rubber bands may be used to hold the two pieces firmly together. In addition, tape can be wrapped around the two sections until the glue is dry.

5. After drying, usually overnight, remove the bands, clamp, and tape, and check to be certain the new piece is in correct position.

6. Shape the new piece with a wood rasp, plane, and sandpaper as described in the previous section on cutting down comb height.

7. Refinish the stock according to the directions in a following section of this chapter.

Refinishing the Stock

Removing Dents

Before the dents can be removed, the finish over them must be removed. Use a high-quality paint and varnish remover, scrape off the finish, wipe, and

sandpaper. Sanding down past the dents will require the removal of too much wood, so the dents must be raised until level with the surrounding surface of the stock.

To raise the dents, two pieces of equipment are needed: (1) a piece of metal that can be heated and placed over the dents to warm them and (2) an ink blotter or a soft piece of flannel cloth. The warming metal can be an electric soldering iron, or you can make a suitable substitute. One way is to put a handle on a 12" piece of $\frac{1}{2}$ " copper tubing. Drive the tubing up into a common file handle, bend it slightly, and hammer the exposed end until flat.

In removing the dent, heat the electric soldering iron, or if one is not available, heat the homemade warmer metal over the kitchen stove until only slightly hot. The metal should be about as hot as a clothes iron: hot enough to iron clothes, but not so hot it will scorch them. The amount you warm the metal is extremely important, because you will scorch the wood of your stock if you get it too hot.

Next, wet the blotter or cotton flannel and lay it directly over the dent. Then touch the heated metal to the blotter or cloth at the point where the wood is dented. The water will be turned to steam, which will penetrate the bent fibers of wood and will cause them to swell up. As they swell, they will return to their original shape, and the dent will be gone.

If one application of moisture and heat is not sufficient, repeat the process two or more times until

the bent wood fibers are level with the rest of the wood.

Sometimes the wood fibers are broken. In this case, they will not return to their original position, or if they do, they will look and feel rough because an evident abrasion remains. In this case, there are two possibilities. The dent area can be sanded out if it is small and shallow, or the hole can be filled or patched.

If the hole is to be filled, first clean out the gouge, removing all dirt and loose fibers. Next, collect a spoonful of sawdust from the stock you are working on and mix with epoxy glue until the mixture takes on the appearance of putty. Press the filler into the hole to overflowing. Be certain the mixture is pressed firmly to expel any air trapped in the dent, and add a little extra to allow for shrinkage. Allow to dry, then sand the mound down even with the surface of the stock. The stock is now ready to refinish.

If the dent is large and deep, the hole will have to be patched. A popular patch is a precut diamond patch of wood or plastic, which can be purchased from gunsmith supply houses. It does not matter if the patch is not the same color as the wood of the stock. Contrasting colors add decoration to the stock.

To insert the patch, lay it over the dent, mark the patch outline, and cut out the gouge to the shape of the diamond about $\frac{1}{8}$ " deep. Glue in the diamond-shaped patch with epoxy glue. After drying, sand the patch until it is even with the surface of the stock.

Refinishing with Varnish

Most American-made factory-produced guns have stocks finished with varnish, lacquer, or one of the newer polyurethane plastic finishes. Only the finer commercially produced European stocks are oil finished, but many American gun enthusiasts re-finish their stocks with an oil finish, since this finish is considered the most handsome. There are advantages and disadvantages to each type of finish. The custom stockmaker who uses several coats of marine-type spar varnish, carefully sanding between coats, produces a handsome product. Spar varnish is one of the old favorite sealers and is still a good choice if it is thinned with turpentine and brushed thoroughly into the wood. If such a stock becomes scratched, it can be retouched with varnish, provided all old wax, dirt, or grease has been thoroughly removed with a solvent. After cleaning the surface, apply several thin coats (thinned with turpentine), one at a time, sanding bad spots in between coats and making certain each coat is thoroughly dry before sanding. Finish off with a final light rubdown with #400 grit paper.

When applied in the preceding manner, a varnished finish is tough, and not easily scratched or chipped. It will dent, scratch, or chip with rough handling, however, and should never be exposed to rain, snow, or excessive moisture for long periods of time. If you hunt in the rain, be certain the gun is wiped dry before putting it away. If moisture soaks into the wood through cracks, at ends, or in the spaces between wood and metal, the finish may

crack and the stock may warp. It is best, therefore, to protect a varnished finish with rubbed coats of good-quality, hard paste wax.

If the stock is to be refinished completely, first remove the old varnish with varnish remover, scraping off the softened finish with a knife and wiping with a rough cloth. Wash thoroughly with alcohol. When completely dry, sand thoroughly, ending with #320 or #400 fine grit sandpaper. Remove the "whiskers" by the method discussed in the section on "Cutting Down Comb Height." Then apply several coats of varnish, lightly sanding between coats as described.

The secret of a good varnish finish is to apply thin coats, sanding in between. Thick coats, carelessly brushed on, will be lacking in good appearance and are more likely to chip easily. Varnish may also be applied from a spray gun, which produces fine results if thinly and evenly applied.

Refinishing with Lacquer

Refinishing with lacquer is usually more difficult than varnish refinishing. Many inexpensive gun stocks are finished with sprayed-on lacquer, which does not penetrate the wood and which chips and flakes off in large chunks, leaving bare wood underneath. Therefore, unless the lacquer needs only a little retouching, the total finish must be removed before the new one is applied. The steps in lacquer refinishing are as follows.

1. Remove old finish with lacquer remover. Brush on, let soak, scrape off with a knife, wipe dry.

2. Sand entire wood surface, ending with #320 or #400 grit paper. Remove "whiskers" as outlined in the section on "Cutting Down Comb Height."

3. If the wood has an open grain, apply a wood filler especially made for stocks and to go under lacquer. It is important that the correct type of filler be used. One made for varnish will be dissolved by lacquer. After filler is applied, repolish stock with a very fine grit sandpaper. In applying filler, rub it in both with and across the grain. Let it dry partially and continue rubbing until it takes on a light sheen. Apply more filler if necessary, to be certain all wood pores and cracks are filled. Wipe off excess only across the grain. If you wipe with the grain, you will remove the filler. Let dry thoroughly.

4. Apply a thin coating of lacquer especially made for gun stocks. A spray can or a paint brush may be used. After drying, polish with #400 fine grit paper. Apply another coat of lacquer. Some workers prefer three or more coats, sanding in between. Use your own judgment about the number of coats. Too many or too thick applications are likely to crack and peel, so be certain the coats are thin and well polished in between.

Sealing, Filling, Refinishing with Polyurethane Plastic

Polyurethane is the toughest of all finishes. It is practically impervious to water and will stand a lot of use, and even abuse, without cracking or peeling. It comes in either a high gloss or a soft or

satin finish. It may be used just as a wood sealer, and/or as a filler, or for the final finish as well. No wood filler is required, since it is its own filler if several coats are applied, with excess rubbed and polished off between coats.

In using polyurethane as a wood sealer, thin it with naphtha and brush into the wood. Wait 15 minutes, and with a rag damp with naphtha rub off the surface coat cross-grain, leaving the wood pores filled. If other types of wood fillers or finishes are to be used over the polyurethane sealer, let it dry 24 hours before other fillers and finishes are applied.

If the polyurethane is to be used as a wood filler as well as a sealer, apply a thick coat of it over the thin sealer coat, about four hours after the sealer has been applied. If you allow the polyurethane sealer to dry, it is so hard that subsequent coats will not stick to it. If you are using a final finish of something other than polyurethane, allow the filler coat to dry a full 24 hours before polishing it back down to the base wood with steel wool. This should leave every wood pore filled completely so that the regular, final finish can be applied.

If you are using the polyurethane for the final finish, it may be applied from a spray can or with a soft, camel hair brush. It brushes on better if thinned 50-50. When used as a final finish, wait no more than 12 hours between coats, so that subsequent coats will stick to those already applied. This means the final coat must be applied over the filler coat, before the latter has a chance to dry completely hard. If a satin or soft finish is desired, it is

best to use this type of polyurethane. If the glossy type is used, it can be rubbed down to produce a soft, velvety look. but it requires a lot of rubbing.

Applying an Oil Finish to the Stock

An oil finish is considered by many gun owners to be the most handsome of all, especially if the wood of the stock is especially fine. The reason an oil finish is not usually applied by commercial gun makers is that it is a time-consuming process. However, the individual gun owner can get a lot of pleasure out of refinishing his stock, and have a beautiful product as a result. While time-consuming, the process is quite simple. The following suggestions should prove helpful.

Use a regular gun-stock oil rather than boiled linseed oil. LinSpeed Oil, TrueOil, and Genuine Oil are three of the better-known brands. They are much easier and faster to use than linseed oil, and leave a handsome finish.

After the old finish is removed, the stock is thoroughly sanded and the whiskers sanded off (see the section on "Cutting Down Comb Height"). Apply a first heavy coat of oil cross-grain, with the grain, or against the grain—any way at all. This initial coat is used as a sealer and filler. When the stock has been filled with oil, hang it outdoors in the sun and wind to dry completely.

Repeat, putting on a second and third heavy coat of oil, drying completely outdoors between coats. Allow the third coat to dry for a full twelve hours at least.

Polish the stock with steel wool, rubbing until all the oil is removed and you are down to the bare wood again. The pores of the wood, however, remain completely filled, with the surface smooth. If there are dimples in the skin, repeat one or two more sloppy coats and cut the finish back to the wood again. Never start the final finish until all the pores are filled.

Apply the first final coat very lightly, with the fingertips, rubbing in and smoothing as you go along. The secret of a fine finish is to smooth out each drop of oil over as broad a surface as possible. Rub each drop in completely until it starts to "pull" as you rub your finger over it. Cover each section in turn, going on to the next without going back over a section already done. Make certain all spots are covered completely.

Allow this coat to dry in the sun and wind. Apply a thin second coat as you did the first, and hang the stock up to dry once more. Repeat this process until the stock takes on a sheen. Usually about five coats are required to obtain a good finish. Some wood requires more coats than others.

If you prefer a high gloss, wipe the stock clean with a special stock rubbing compound, and apply one final coat of stock oil. If you prefer a rubbed finish, rub the entire stock very lightly with the special stock-rubbing compound, rubbing just enough to remove some of the gloss but leaving a satin-glow look to the finish.

Whether you prefer the high-gloss or rubbed look, the final step is to wax the stock completely

with good-quality paste wax, rubbing until hard. Finish off by wiping with a soft flannel cloth.

Blueing the Gun

Methods

There are essentially three methods for blueing a gun: (1) the accelerated process, (2) the fast, one-shot "hot blue" process, and (3) the traditional, slow-blue, slow-rust method, which requires repeated applications. In addition, "tough-up blueing" has been developed for refinishing small spots where the regular blueing has been scratched or worn off. Touch-up blueing is usually an accelerated process also, but it will be discussed separately because it may utilize either hot or cold methods.

The Accelerated Process

The accelerated process is based upon the principle that metal oxidizes more rapidly when it is warm. After cleaning and polishing, the gun metal is heated before the blueing solution is applied. As the solution dries, the metal oxidizes, leaving a heavy coating of rust. When the rust is removed, the metal is left a bluish tint. Repeated applications give the desired shade. Finally, a finishing oil is applied to stop all rusting action and to dry the surface. After this oil is removed, regular gun oil is applied, and the metal is polished to bring out the shiny blue luster of the coating.

There are several blueing products made to use

in the accelerated process. Herter's Belgium Blue, Stoeger's Yankee Bluer, and Brownell's Dicropan IM are three of the most common. In addition to blueing solutions, a number of items of equipment are needed.

1. *A heating tank.* This should be about 6" wide, 6" deep, and 36" long to handle the longest barrel. A long metal flower or window box is a good choice, or a tank especially made for the purpose may be purchased. Galvanized tanks should not be used since the blueing chemicals react with them and cause problems.

2. *Electric hotplate for heating the tank of water.*

3. *Electric grinder* with wire brush, hard rubber wheel, buffing pad attachments, and buffing compounds.

4. *Fine steel wool.*

5. *Large tongs or forceps* for handling cotton balls.

6. *Absorbent cotton, Q-tips, and soft wiping cloths.*

7. *Finishing oil* especially made for gun blueing.

8. *Regular gun oil.*

9. *Rubber gloves* to protect your hands, since blueing solution should never be allowed on your hands.

10. *Washing soda or a regular gun cleaner* such as Blu-Blak Cleaner or Brownell's Picro-Clean No. 909.

11. *Wooden dowel* small enough in diameter and

long enough to go through the gun barrel and stick out both ends.

12. *Heavy string, picture wire, or coat hanger wire* to use in lowering barrel and other metal parts into the tank.

13. *Quart glass jar* to hold blueing solution. *Picture wire* to wrap around the neck of the jar to lower it into the tank.

14. *Mineral spirits* for cleaning finishing oil off the metal parts.

The following steps are used in the accelerated process of blueing.

1. Disassemble the gun. If only the barrel is to be blued, only this must be removed, but if the receiver and smaller parts are to be blued, the stock must be taken off and various small parts removed from the receiver. All aluminum and pot metal must be removed, because blueing salts will eat them up. Receivers made of cast powdered iron will not take blueing. Also, case-hardened receivers such as those found on some double-barrel shotguns will not blue by regular methods. They can be blued, but it requires special knowledge.

2. Polish the barrel and other parts to be blued. Use the electric grinder with the wire brush and the hard rubber wheel to remove rusted or pitted spots. Polish with buffing compounds and pad until metal is bright.

3. Place the dowel through the barrel and attach suspension wires or string to each end of the dowel. Tie strings or wires to every other metal part to be

cleaned also. These strings or wires are used to hang the metal parts in the hot tank.

4. Heat a tankful of water, to which the proper amount of cleaning substance has been added. Boil the metal parts in this cleaning solution for five minutes. Remove metal parts and rinse in plain water. Be careful not to touch any metal with your fingers, as it leaves prints that prevent proper blueing. It is best to suspend all parts in the air with the strings or wires, so the parts do not touch any surface.

5. After you are certain all metal is thoroughly cleaned, dump out the cleaning water, rinse and clean the tank thoroughly, and partially fill it with plain, clean water. Place the quart jar containing the blueing solution in the tank so that the top of the jar sticks out several inches from the top of the water, making certain the water does not get into the jar. Turn on the heat, and bring the water to a hard boil.

6. When the water is boiling hard, lower the barrel and other gun parts into the tank, boiling them until you are sure they have reached the maximum temperature (usually about 5–10 minutes).

7. Meanwhile roll several pieces of cotton into round swabs the size of golf balls to use in applying the blueing solution. Put on your rubber gloves, pick up a cotton swab with the tongs, and soak it in the blueing solution. Remove the barrel and, with even strokes the full length of the barrel, apply the solution to the barrel, doing this rapidly to take advantage of the metal's high temperature. The

solution dries almost as soon as it is applied, but keep applying it as long as the hot metal will dry it. Do the same for all smaller metal parts. Use Q-tips dipped in the blueing for difficult-to-reach cracks and corners.

8. After about five minutes, or after the solution is thoroughly dry, you will notice a heavy coat of rust on the metal. This rust must be completely removed. The easiest way is to rub the metal surfaces hard with a handful of steel wool. Each time a ball of steel wool becomes clogged with rust, discard it and use a new piece. After cleaning away the rust, the metal should evidence a light bluish tint, but the color will deepen with each application.

9. Repeat heating, blueing, and polishing until the metal has reached the desired shade of blue-black. Be certain the metal is thoroughly reheated each time before another coating of blueing is applied. Rub the final application hard with the steel wool to remove every bit of rust, but do not return the metal to the boiling water.

10. To be certain all the solution and rust is removed, apply a thick coating of finishing oil to all blued parts, allowing the oil to remain on the parts (suspended in the air) overnight.

11. Wash the metal parts in mineral spirits the next day, and apply a coat of regular gun oil as you reassemble the gun. Leave the gun out of the case for a few days, recoat once or twice with gun oil until the oil is absorbed into the metal surface, then wipe clean with a soft cloth.

Some gunsmiths advocate pouring oil into the barrel and sealing up the ends of the barrel with proper-size wooden plugs before immersing it into the hot water. The only problem is that the heat often causes the plugs to blow out, allowing the oil to flow out into the tank. Therefore, the suggestions given here do not require you to seal off the barrel during water immersion. But this does mean you will have to dry and oil the inside of the barrel thoroughly as part of the total process. Any rust spots inside the barrel can usually be removed by ordinary cleaning methods.

The Hot-Blue Process

The blueing process just described is called the accelerated process. But there is still a faster method, known as the "hot-blue" process. It is a one-shot procedure. For this method, a minimum of two tanks is required: one for use for the cleaning solution and later the neutralizing solution, and one to hold the blueing solution. A third tank is helpful so that the cleaning solution, blueing solution, and neutralizing solution can each be put in its own tank at the same time. Professionals even use a fourth tank for soluble oil, but this is not necessary since the oil can be put on by hand. A number of different blueing solutions are used. Lynx-Line Blu-Blak and Brownell's Oxynate-7 are commonly used in professional shops. Stoeger's Lightning Bluer has also been used widely for many years. The following steps are used in the "hot-blue" method.

1. Disassemble the gun, sorting out the parts to

be blued (see step 1 under the accelerated process).

2. Remove all old blueing and rust, and polish all parts to be blued (see step 2 under the accelerated process). The process of removing old blueing, rust, and so on may be further speeded up by dunking all parts in a stripping bath consisting of a 10 percent solution of nitric acid or a 10 to 20 percent solution of muriatic acid. Start with the 10 percent solution, running a test strip of blued metal through it, and increasing the percentage if the solution is not strong enough. However, be certain the metal is not immersed too long, for a deep etching will require too much polishing. After the old blueing is removed, rinse thoroughly with clear water and polish the metal bright on the polishing wheel. Be certain not to touch the metal with your bare hands.

3. Heat the tank of blueing solution to 285° . Also, heat the tank of cleaning solution to a good rolling boil. Washing soda, Blu-Blak Cleaner, or Brownell's Picro-Clean No. 909 may be used as cleaning solutions. If you are using a separate third tank, heat the neutralizing solution in it until it comes to a boil.

4. Lower the metal into the boiling cleaning solution and allow to remain for the period stipulated for the particular cleaner. Remove metal and rinse in clear water to wash off cleaning solution. If you do not have a third tank, empty the cleaning solution at this time, clean the tank, fill with the neutralizing solution, and heat this to a boil.

5. Place the metal in the tank of hot blueing solution, suspending the parts carefully so as not to touch the sides or bottom of the tank. The metal

should start to blue in about five minutes, but a good color is usually reached in about 15 minutes. If a part is not taking the blueing well, remove it, wipe it with a pad of surgical gauze, and place it back in the blueing tank. After the parts are blued, rinse them in clear water.

6. Place all blued, rinsed parts in the neutralizer tank and boil for 30 minutes to neutralize the remaining blueing solution.

7. Finally, immerse the parts in a tank of soluble finishing oil for about 10 minutes, or if no separate oil tank is provided, coat the parts thoroughly with the oil, rubbing it on with large cotton swabs. Hang up the parts to drip oil and dry until the following day.

8. Rinse all parts in mineral spirits, recoating with regular gun oil as the gun is reassembled. Reoil the gun thoroughly, allowing the oil to stand for several days until absorbed into the pores of the metal. Wipe clean with a polishing cloth.

The Slow-Blue Process

The third process of gun blueing, the traditional slow-blue, slow-rust method will not be described here, since it is very time consuming. It is slow because the blueing is put on cold, and each time the blueing compound is applied, several days must elapse to give the metal a chance to oxidize before the following step is employed. However, the process produces a beautiful finish with a minimum of equipment. Stoeger's Gunsmith Bluer is a good

example of a solution to use in this process. Directions for use come with the bottle.

Touch Up Blueing

Touch-up blue is designed for touching up a scratched place on the surface of your gun. Two brands, Minute Man and Numrich's 44-40, use an accelerated process, especially if the metal is slightly heated. The metal is first polished and cleaned, then heated slightly. The touch-up is applied with a Q-tip in long, even strokes. It is allowed to work for a few minutes, then wiped clean. If the color is not deep enough, another coat is applied after the metal is reheated. After the desired color is achieved, the area is rubbed thoroughly with gun oil.

Oxpho-Blue and Stoeger's Instant Blue are touch-up solutions that may be used cold. The metal surface is first polished. Oxpho-Blue is applied with a Q-tip and rubbed hard with steel wool. Then a second coat is put on with long, even strokes to complete the finish. Stoeger's Instant Blue is applied, wiped off when milky, and followed by an acid solution, which produces the blue color. The process is repeated for a deeper color. Finally, gun oil is rubbed on to halt the oxidizing process. The surfaces are then polished lightly with very fine steel wool. For best results, carefully follow the instructions for each brand.

Directory of Arms Goods and Services

Ammunition (Commercial)

- ALCAN SHELLS (see SMITH & WESSON-FIOCCHI, INC.)
AMRON CORP., 525 Progress Ave., Waukesha, WI 53186
CASCADE CARTRIDGE INC. (see OMARK)
FEDERAL CARTRIDGE CO., 2700 Foshay Tower, Minneapolis, MN 55402
FRONTIER CARTRIDGE CO., INC., Box 906, Grand Island, NE 68801
OMARK-CCI, INC., Box 856, Lewiston, ID 83501
REMINGTON ARMS CO., Bridgeport, CT 06602
SERVICE ARMAMENT, 689 Bergen Blvd., Ridgefield, NJ 07657
SMITH & WESSON-FIOCCHI, INC., 3640 Seminary Rd., Alton, IL 62002
SPEER-DWM, Box 896, Lewiston, ID 83501
SUPER-VEL CARTRIDGE CO., Box 40, Shelbyville, IN 46176
WEATHERBY'S, 2781 E. Firestone Blvd., South Gate, CA 90280
WINCHESTER-WESTERN, East Alton, IL 62024

Ammunition (Foreign)

- ABERCROMBIE & FITCH, Madison at 45th St., New York, NY 10017
AMMODYNE, Box 1859, Los Angeles, CA 90053 (RWS)
CANADIAN IND., LTD. (C.I.L.), Box 10, Montreal, Que., CAN
C-I-L AMMUNITION INC., P.O. Box 831, Plattsburgh, NY 12901
CENTENNIAL ARMS CO., 3318 W. Devon Ave., Chicago, IL 60645 (Hirtenberg, Austrian)
COLONIAL AMMUNITION CO., Box 8511, Auckland, NZ

DWM, SPEER PRODS. INC., Box 641, Lewiston, ID 83501
GEVELOT OF CANADA, Box 1593, Saskatoon, Sask.,
CAN

HY-SCORE ARMS CO., 200 Tillary, Brooklyn, NY 11201
PAUL JAEGER INC., 211 Leedom St., Jenkintown, PA
19046

S. E. LAZLO, 200 Tillary, Brooklyn, NY 11201

NORMA-PRECISION, South Lansing, NY 14882

OREGON AMMO SERVICE, Box 19341, Portland, OR
97219

STOEGER ARMS CORP., 55 Ruta St., S. Hackensack, NJ
07606

JAMES C. TILLINGHAST, Box 568, Marlow, NH 03456

Ammunition Components —

Bullets, Powder, Primers

ACCURACY BULLET CO., 2443 41st St., San Francisco,
CA 94116 (Perfecast bullets)

ALCAN (see SMITH & WESSON AMMUNITION CO.)

AMMO-O-MART, P.O. Box 66, Hawkesbury, Ont., CAN
(Curry bullets)

AUSTIN POWER CO. (see RED DIAMOND DIST. CO.)

BAHLER DIE SHOP, Box 386, Florence, OR 97439 (17
cal. bull.)

LEE BAKER, 10314 Langmuir Ave., Sunland, CA 91040
(17 cal. bull.)

JOE J. BALICKIE, 6108 Deerwood Pl., Raleigh, NC
27607

BALLISTIC RESEARCH INDUSTRIES (see S & W-FIOCCHI)
(12 ga. Sabot bullets)

BITTERROOT BULLET CO., Box 412, Lewiston, ID
83501

THE BULLET BOYS, Box 367, Jaffrey, NH 03452 (cast
bullets)

CENTRIX, 2116 N. 10th Ave., Tucson, AZ 85705

- KENNETH E. CLARK, 18738 Highway 99, Madera, CA 93637 (Bullets)
- COLORADO CUSTOM BULLETS, Rt. 1, Box 507-B, Montrose, CO 81401
- CURRY BULLETS CANADA, P.O. Box 66, Hawkesbury, Ont., CAN
- DIVISION LEAD, 7742 W. 61 Pl., Summit, IL 60502
- DUPONT, Explosives Dept., Wilmington, DE 19898
- ELK MOUNTAIN SHOOTERS SUPPLY, Star Route, Box 1157, Pasco, WA 99301 (Alaskan bullets)
- FARMER BROS. MFG. CO., 1102 Washington St., Eldora, IA 50627 (Large shotshell wads)
- FORTY FIVE RANCH ENTERPRISES, 119 S. Main, Miami, OK 74354
- GODFREY RELOADING SUPPLY, R.R. 1, Box 688, Brighton, IL 62012 (cast bullets)
- LYNN GODFREY, see: ELK MTN. SHOOTERS SUPPLY
- G.J. GODWIN, 455 Fox Lane, Orange Park, FL 32073 (cast bullets)
- GREEN BAY BULLETS, 233 No. Ashland, Green Bay, WI 54303 (lead)
- FRANK A. HEMSTED, Box 281, Sunland, CA 91040
- HERCULES POWDER CO., 910 Market St., Wilmington, DE 19899
- HERTER'S INC., Waseca, MN 56093
- HI-PRECISION CO., 109 Third Ave., N.E., Orange City, IA 51041
- B. E. HODGDON, INC., 7710 W. 50th Hwy., Shawnee Mission, KS 66202
- HORNADY MFG. CO., Box 1848, Grand Island, NE 68801
- N. E. HOUSE CO., Middletown Rd., E. Hampton, CT 06424 (zinc bases only)
- DAVID INGRAM, Box 4263, Long Beach, CA 90804 (17/20 cal. bullets)
- JURRAS MUNITION CORP., Box 140, Shelbyville, IN 46176

KUSH PLASTICS, P.O. Box 366, Palatine, IL 60067 (shot-shell wads)

L. L. F. DIE SHOP, 1281 Highway 99 North, Eugene, OR 97402

LAGE WADS, see FARMER BROS.

LEE'S PRECISION BULLETS, 10314 Langmuir Ave., Sunland, CA 91040 (17 cal.)

LJUTIC IND., INC., Box 2117, Yakima, WA 98902 (Mono-wads)

LOMONT PRECISION BULLETS, 4425 Fairfield, Ft. Wayne, IN 46807

Bullet and Case Lubricants

ALPHA-MOLYKOTE, DOW CORNING CORP., 45 Commerce Dr., Trumbull, CT 06601

BIRCHWOOD-CASEY CO., INC., 7900 Fuller Rd., Eden Prairie, MN 55343 (Anderol)

BULLET POUCH, Box 4285, Long Beach, CA 90804 (Mirror-Lube)

CHOPIE MFG. INC., 531 Copeland, La Crosse, WI 54601 (Black-Solve)

COOPER-WOODWARD, Box 972, Riverside, CA 92502 (Perfect Lube)

GREEN BAY BULLETS, 233 N. Ashland, Green Bay, WI 54303 (EZE-Size case lube)

HERTER'S INC., Waseca, MN 56903 (Perfect Lubricant)
IPCO (INDUSTRIAL PRODUCTS CO.), Box 14, Bedford, MA 01730

JAVELINA PRODUCTS, Box 337, San Bernardino, CA 92402 (Alox beeswax)

JET-AER CORP., 100 Sixth Ave., Paterson, NJ 07524

LENZ PROD. CO., Box 1226, Sta. C, Canton, OH 44708 (Clenzoil)

LYMAN GUN SIGHT PRODUCTS, Middlefield, CT 06455 (Size-Ezy)

- MICRO SHOOTER'S SUPPLY, Box 213, Las Cruces, NM
88001 (Micro-Lube)
- MIRROR LUBE, American Spl. Lubricants, Box 4275,
Long Beach, CA 90804
- NUTEC, Box 1187, Wilmington, DE 19899 (Dry-Lube)
- PACIFIC TOOL CO., P.O. Drawer 2048, Ordnance Plant
Rd., Grand Island, NB 68801
- PHELPS REL. INC., Box 4004, E. Orange, NJ 07019
- RCBS, INC., Box 1919, Oroville, CA 95965
- SAECO REL. INC., 726 Hopmeadow St., Simsbury, CT
06070
- SCIENTIFIC LUBRICANTS CO., 3753 Lawrence Ave.,
Chicago, IL 60625
- SHOOTERS ACCESSORY SUPPLY (SAS), Box 250, N.
Bend, OR 97459
- SPORTS DISTR. CO., Rte. 1, Rapid City, SD 57701 (Re-
loader No. 7)
- TESTING SYSTEMS, INC., 2832 Mt. Carmel, Glenside,
PA 19038

Bullet Swage Dies and Tools

- BAHLER DIE SHOP, Box 386/412 Hemlock St., Florence,
OR 97439
- BELMONT PRODUCTS, Rte. #1, Friendsville, TN
37737
- C-H TOOL & DIE CORP., P.O. Box L, Owen, WI 54460
- CLYMER MFG. CO., 14241 W. 11 Mile Rd., Oak Park, MI
48237
- LESTER COATS, 416 Simpson St., North Bend, OR
97459 (lead wire cutter)
- HEMP DIES, Frank A. Hemsted, P.O. Box 281, Sunland,
CA 91040
- HERTER'S INC., Waseca, MN 56093
- HOLLYWOOD, WHITNEY SALES INC., P.O. Box 875,
Reseda, CA 91335

INDEPENDENT MACHINE & GUN SHOP, 1416 N. Hayes,
Pocatello, ID 83201 (TNT)

L.L.F. DIE SHOP, 1281 Highway 99 North, Eugene, OR
97402

RORSCHACH PRECISION PRODUCTS, P.O. Box 1613, Irving,
TX 75060

SAS DIES, P.O. Box 250, North Bend, OR 97459

ROBERT B. SIMONSON, Rte. 2, 2129 Vanderbilt Rd.,
Kalamazoo, MI 49002

TNT (see IND. MACH. & GUN SHOP)

Choke Devices and Recoil Absorbers

A&W ENGINEERING, 6520 Rampart St., Houston, TX
77036 (shotgun diverter)

ARMS INGENUITY CORP., Box 1, Weatogue, CT 06089
(Jet-Away)

CONTRA-JET, 7920 49th Ave., S. Seattle, WA 98118

DAHL'S GUN SHOP, Rt. 2, Billings, MT 59101

EDWARDS RECOIL REDUCER, 269 Herbert St., Alton, IL
62002

EMSCO CHOKES, 101 Second Ave., S. E. Waseca, MN
56093

HERTER'S INC., Waseca, MN 56093 (Vari-Choke)

LYMAN GUN SIGHT PRODUCTS, Middlefield, CT 06045
(Cutts Comp.)

C. R. PEDERSEN & SON, Ludington, MI 49431 (Sha-Cul
brake)

PENDLETON DEKICKERS, 1210 S.W. Hailey Ave., Pendleton,
OR 97801

POLY-CHOKE CO., INC., Box 296, Hartford, CT 06101

ST. LOUIS PRECISION PRODUCTS, 902 Michigan Ave.,
St. Louis, MI 48880 (Gun-Tamer)

Gun Cases, Cabinets and Racks

ALCO CARRYING CASES, INC., 601 W. 26th St., New
York, NY 10001

- AMER. SAFETY GUN CASE CO., Holland, MI 49424
- AREMAC CO., 101 N. Verity Parkway, Middletown, OR 45042
- ARTISTIC WOOD SPECIALTIES, 923-29 W. Chicago Ave., Chicago, IL 60622
- MORTON BOOTH CO., Box 123, Joplin, MO 64801
- BOYT CO., Box 1108, Iowa Falls, IA 50126
- BREWSTER CORP., Old Lyme, CT 06371
- BROWNING ARMS CO., Rt. 4, Box 624-B, Arnold, MO 63010
- CASTLE SPTG. GOODS, INC., 498 Nepperhan Ave., Yonkers, NY 10701
- CHALLENGER MFG. CO., 94-28 Merrick Blvd., Jamaica, NY 11433
- CINCINNATI IND. INC. (CINDUS), Cincinnati (Lockland), OH 45215
- COLADONATO BROS., Box 156, Hazleton, PA 18201
- DUTTON's, 7840 Phillips Hwy., Jacksonville, FL 32216 (single rack)
- ELLWOOD EPPS SPORTING GOODS, Clinton, Ont., CAN
- FARBER BROS., INC., 821 Linden Ave., Memphis, TN 38101 (truck pouch)
- FERRELL CO., Rte. 3, Gallatin, TN 37066 (Redi-Rack)
- FLAMBEAU PLASTICS CORP., 801 Lynn, Baraboo, WI 53913
- GUN-HO CASE MFG. CO., 110 East 10th St., St. Paul, MN 55101
- GUN RACKS, INC., P.O. Box 22675, Houston, TX 77027
- B. E. HODGDON, INC., 7710 W. 50 Hiway, Shawnee-Mission, KS 66202
- ITHACA GUN CO., Terrace Hill, Ithaca, NY 14850
- J-K IMPORTS, Box 403, Novato, CA 94947 (leg o' mutton case)
- JUMBO SPORTS PRODS., P.O. Box 280-Airport Rd., Frederick, MD 21701

- KOLPIN BROS. CO., INC., Box 231, Berlin, WI 54923
MARBLE ARMS CORP., 1120 Superior, Gladstone, MI 49837
NATIONAL SPORTS DIV., 19 E. McWilliams St., Fon du Lac, WI 54935
NORTEX CO., 2821 Main St., Dallas, TX 75226 (automobile gun rack)
PAUL-REED, INC., P.O. Box 227, Charlevoix, MI 49720
PENGUIN ASSOC., INC., Box 97, Parkersburg, PA 19365
PRECISE IMP. CORP., 3 Chestnut, Suffern, NY 10901
PRETTO CABINET CO., 1201 E. Walnut, Oglesby, IL 61348
PROTECTO PLASTICS, INC., Box 37, Wind Gap, PA 18091
RICHLAND ARMS CO., 321 W. Adrian, Blissfield, MI 49228
SAF-T-CASE, Box 10592, Dallas, TX 75207
SAN ANGELO DIE CASTINGS, Box 984, San Angelo, TX 76901
BUDDY SCHOELLKOPF, 4100 Platinum Way, Dallas, TX 75237
SILE DISTR., 7 Centre Market Pl., New York, NY 10013 (leg o' mutton case)
STEARN MFG. CO., Div. & 30th St., St. Cloud, MN 56301
SURE SHOOT'N, Box 195, Jacksonville, IL 62650 (leg o' mutton case)
WESTERN HOLDER CO., Box 33, Menomonee Falls, WI 53051
WOODSTREAM CORP., Box 327, Lititz, PA 17543
YIELD HOUSE, INC., RFD, No. Conway, NH 03860

Guns and Gun Parts, Replica and Antique

- ANTIQUE GUN PARTS, INC., 569 S. Braddock Ave., Pittsburgh, PA 15221 (ML)

- ARMOURY INC., Rte. 25, New Preston, CT 06777
- BANNERMAN, F., Box 126, Blue Point, Long Island, NY 11715
- SHELLEY BRAVERMAN, Athens, NY 12015 (obsolete guns)
- PHILIP R. CROUTHAMEL, 817 E. Baltimore, E. Lansdowne, PA 19050
- CHARLES E. DUFFY, Williams Lane, West Hurley, NY 12491
- FEDERAL ORDNANCE INC., P.O. Box 36032, Los Angeles, CA 90036
- GREELEY ARMS CO., INC., 223 Little Falls Rd., Fairfield, NJ 07006
- GUNNER'S ARMORY, 2 Sonoma, San Francisco, CA 94133
- H&B GUN CORP., 1228 Fort St., Lincoln Park, MI 48166
- HUNTER'S HAVEN, Zero Prince St., Alexandria, VA 22314
- BOB LOVELL, Box 401, Elmhurst, IL 60126
- NUMRICH ARMS CO., West Hurley, NY 12491
- PACIFIC INTL. IMPORT CO., 2416-16th St., Sacramento, CA 95818
- POTOMAC ARMS CORP. (see HUNTER'S HAVEN)
- REED & CO., Shokan, NY 12481
- MARTIN B. RETTING, INC., 11029 Washington, Culver City, CA 90230
- SANTA BARBARA OF AMERICA, LTD., 930 N. Beltline Rd., #132, Irving, TX 75060 (barrels and barreled actions)
- SARCO, INC., 192 Central, Stirling, NJ 07980
- R. A. SAUNDERS, 3253 Hillcrest Dr., San Antonio, TX 78201 (clips)
- SCHMID & LADD, 14733 Hwy. 19 S9., Clearwater, FL 33516
- SHERWOOD DISTR. INC., 7435 Greenbush Ave., No. Hollywood, CA 91605

CLIFFORD L. SMIRES, R.D., Columbus, NJ 08022 (Mau-
ser rifles)

SPORTING ARMS, INC., 9643 Alpaca St., So. El Monte,
CA 91733 (M-1 Carb access.)

N. F. STREBE, 4926 Marlboro Pike, S.E. Washington,
DC 20027

TRIPLE-K MFG, CO., 568-6th Ave., San Diego, CA 92101

Guns, U.S. Made

AGAWAM ARMS CO., 916 Suffield St., Agawam, MA
01001

AMERICAN FIREARMS MFG. CO., INC., 5732 Kenwick
Dr., San Antonio, TX 78238

ARMALITE, 118 E. 16th St., Costa Mesa, CA 92627

AUTO MAG CORP., 2480 E. Colorado Blvd., Pasadena,
CA 91107

CARAVILLE ARMS, P.O. Box 377, Thousand Oaks, CA
91360

CHAMPLIN FIREARMS, INC., Box 3191, Enid, OK 73701

CHARTER ARMS CORP., 265 Asylum, Bridgeport, CT
06610

CLERKE RECREATION PROD., 2040 Broadway, Santa
Monica, CA 90404 (22 Cal. Rev.)

COLT'S, 150 Huyshope Ave., Hartford, CT 06102

COMMANDO ARMS, INC., Box 10214, Knoxville, TN
37355

CUMBERLAND ARMS, 1222 Oak Dr., Manchester, TN
37355

DAY ARMS CORP., 7515 Stagecoach Lane, San Antonio,
TX 78227

FIREARMS DEVELOPMENT, INC., 218 Austin St., Den-
ton, TX 76201

FIREARMS INTL. CORP. (see GARCIA)

GERA ARMS, 1535 McKinley, Azusa, CA 91702

GOLDEN AGE ARMS CO., Box 82, Worthington, OH
43085

- GYROJET (see INTERCONTINENTAL ARMS)
HARRINGTON & RICHARDSON, Park Ave., Worcester,
MA 01610
HIGH STANDARD MFG. C9., 1817 Dixwell Ave. Ham-
den, CT 06514
INDEPENDENT RES. & DEVELOPMENT, INC., (I.R.D.)
6304 Locker Lane, San Antonio, TX 78238
INTERCONTINENTAL ARMS, INC., 2222 Barry Ave., Los
Angeles, CA 90064
ITHACA GUN CO., Ithaca, NY 14850
IVER JOHNSON ARMS & CYCLE WORKS, Fitchburg, MA
01420
JACKSON HOLE ARMS CORP., Box T, Jackson, WY 83001
J & R CARBINE (see: PJK INC.)
KENT FIREARMS LTD., INC., 14 E. Woodland Ave.,
Springfield, PA 19064
MB ASSOCIATES (see INTERCONTINENTAL ARMS)
MARLIN FIREARMS CO., 100 Kenna Dr., New Haven,
CT 06473
MERRILL CO., INC., 209 Howard St., Fonda, IA 50540
O. F. MOSSBERG & SONS, INC., 7 Grasso St., No. Haven,
CT 06473
NAVY ARMS CO., 689 Bergen Blvd., Ridgefield, NJ
07657
NOBLE MFG. CO., INC., S. Main St., Haydenville, MA
01039
NUMRICH ARMS CORP., W. Hurley, NY 12491
PJK INC., 1527 Royal Oak Dr., Bradbury, CA 91010
(J&R Carbine)
PLAINFIELD MACHINE CO., INC., Box 447 Dunellen,
NJ 08812
POTOMAC ARMS CORP., P.O. Box 35, Alexandria, VA
22313 (M1 replicas)
RANGER ARMS CO., Box 704, Gainesville, TX 76240
(Texan Mag.)

- RAU ARMS CORP., 220 Metcalf Rd., El Dorado, KS
67042
- REMINGTON ARMS CO., Bridgeport, CT 06602
- SAVAGE ARMS CORP., Westfield, MA 01085
- SEARS, ROEBUCK & CO., 825 S. St. Louis, Chicago, IL
60607
- SEVENTREES LTD., 315 W. 39th St., New York, NY
10018
- SMITH & WESSON, INC., Springfield, MA 01101
- SPORTING ARMS, INC., 2643 Alpaca St., S. El Monte,
CA 91733 (M-1 carbine)
- STERLING ARMS CORP., 2206 Elmwood Ave., Buffalo,
NY 14216
- STURM, RUGER & CO., Southport, CT 06490
- THOMPSON-CENTER ARMS, Box 2405, Rochester, NH
03867 (Contender pistol)
- TINGLE, 1125 Smithland Pike, Shelbyville, IN 46176
(muzzleloader)
- UNIVERSAL FIREARMS CORP., 3746 E. 10th St., Hialeah,
FL 33013
- WARD's, 619 W. Chicago, Chicago, IL 60607 (Western
Field brand)
- WEATHERBY's, 2781 E. Firestone Blvd., South Gate,
CA 90280
- DAN WESSON ARMS, 293 S. Main St., Monson, MA
01057
- WESTERN VALLEY ARMS CO., 524 W. Main St., Al-
hambra, CA 91801
- WINCHESTER REPEATING ARMS CO., New Haven, CT
06504
- WINSLOW ARMS CO., P.O. Box 578, Osprey, FL 33595

Guns (Foreign)

- ABERCROMBIE & FITCH, Madison at 45th, New York,
NY 10017

- ALASKAN RIFLES, Box 30, Juneau, AK 99801
- AMERICAN IMPORT CO., 1167 Mission St., San Francisco, CA 94103
- ARMI FABBRI, Casella 206, Brescia, IT 25100
- ARMI FAMARS, Via Cinelli 33, Gardone V.T. (Brescia), IT 25036
- ARMOURY INC., Rte 25, New Preston, CT 06777
- ATLAS ARMS, INC., 7952 Waukegan Rd., Niles, IL 60648
- BENET ARMS CO., Box 33, Afton, VA 22920
- BLUMENFELD CO., 80 W. Virginia Ave., Memphis, TN 38100
- BROWNING, Rt. 4, Box 624-B, Arnold, MO 63010
- CENTENNIAL ARMS CORP., 3318 W. Devon, Chicago, (Lincolnwood) IL 60645
- CENTURY ARMS CO., 3-5 Federal St., St. Albans, VT 05478
- CHAMPLIN FIREARMS, INC., Box 3191, Enid, OK 73701 (Gebruder Merkel)
- CONNECTICUT VALLEY ARMS CO., Candlewood Hill Rd., Higganum, CT 06441 (CVA)
- CONTINENTAL ARMS CORP., 697 Fifth Ave., New York, NY 10022
- W. H. CRAIG, Box 927, Selma, AL 36701
- CRUSADER ARMS CO., Box 2801, 800 S. 4th St., Louisville, KY 40202
- DAIWA, 14011 Normandie Ave., Gardena, CA 90247
- CHARLES DALY, INC., 90 Chambers St., New York, NY 10007
- DAVIDSON FIREARMS CO., 2703 High Pt. Rd., Greensboro, NC 27403 (shotguns)
- DAVIS GUN SHOP, 7213 Lee Highway, Falls Church, VA 22046 (Fanzoj, Ferlach; Spanish guns)
- DIXIE GUN WORKS, INC., Hwy 51, South, Union City, TN 38261 ("Kentucky" rifles)
- EUROARMS, Via Solferino 13/A, 25100 Brescia, IT

FFV SPORTS INC., P.O. Box 195, Billings, NY 12510
(Husqvarna)

J. FANZOJ, P.O. Box 25, Ferlach, AUS 9170

R. C. FESSLER & CO., 1634 Colorado Blvd., Los Angeles, CA 90041

FIREARMS CENTER INC. (FCI), 113 Spokane, Victoria, TX 77901

FIREARMS IMP. & EXP. CO., 2470 N.W. 21st St., Miami, FL 33142

FIREARMS INTERNATIONAL CORP., 515 Kerby Hill Rd., Washington, DC 20022

FLAIG'S LODGE, Millvale, PA 15209

FLORIDA FIREARMS CORP., P.O. Box 237, Hialeah, FL 33010

FREELAND'S SCOPE STANDS, INC., 3737 14th Ave., Rock Island, IL 61201

J. L. GALEF & SON, INC., 85 Chambers, New York, NY 10007

GARCIA SPTG. ARMS CORP., 329 Alfred Ave., Teaneck, NJ 07666

GEVARM (see BLUMENFELD CO.)

GEVELOT OF CAN. LTD., Box 1593, Saskatoon, Sask., CAN

GOLD RUSH GUNS, Box 33, Afton, VA 22921 (SIG)

H. F. GRIEDER, Box 487, Knoxville, IL 61448
(Hammerli)

HARRINGTON & RICHARDSON ARMS CO., 320 Park Ave., Worcester, MA 01610 (HK pistol)

HAWES FIREARMS CO., 8224 Sunset Blvd., Los Angeles, CA 90046

HEALTHWAYS, Box 45055, Los Angeles, CA 90061

A. D. HELLER, INC., Box 268, Grand Ave., Baldwin, NY 11510

HERTER'S, Waseca, MN 56093

HUSQVARNA, see FFV SPORTS INC.

- INTERARMCO, (see INTERARMS) (Walther)
INTERARMS LTD., 10 Prince St., Alexandria, VA 22313
(Mauser)
INTERCONTINENTAL ARMS, 2222 Barry Ave., Los Angeles, CA 90064
INTERNATIONAL FIREARMS CO., LTD., Montreal 1, Que., CAN
ITHACA GUN CO., Terrace Hill, Ithaca, NY 14850
(Perazzi)
ITALGUNS, Via Leonardo da Vinci 36, 20090 Zingoni Di Trezzano, Milano, IT
JBL ARMS CO., 4315 Warren St., Davenport, IA 52806
J-K IMPORTS, Box 403, Novato, CA 94947 (Italian)
PAUL JAEGER INC., 211 Leedom St., Jenkintown, PA 19046
JANA INTL. CO., Box 1107, Denver, CO 80201 (Parker-Hale)
J. J. JENKINS, 462 Stanford Pl., Santa Barbara, CA 93105
GUY T. JONES IMPORT CO., 905 Gervais St., Columbia, SC 29201
KASSNAR IMPORTS, P.O. Box 3895, Harrisburg, PA 17105
KLEINGUENTHER'S, P.O. Box 1261, Seguin, TX 78155
KNIGHT & KNIGHT, 5930 S.W. 48 St., Miami, FL 33155
(made-to-order only)
KRIEGHOFF GUN CO., P.O. Box 48-1367, Miami, FL 33148
L. A. DISTRIBUTORS, 4 Centre Market Pl., New York, NY 10013
JOS. G. LANDMANN, 2308 Preetz/Holstein, W GER (JGL)
S. E. LASZLO, 200 Tillary St., Brooklyn, NY 11201
LEVER ARMS SERV. LTD., 771 Dunsmuir, Vancouver 1, B.C., CAN

- LIBERTY ARMS ORGANIZATION, Box 306, Montrose,
CA 91020
- MCKEOWN'S GUNS, R.R. 1, Pekin, IL 61554
- MCQUEEN SALES CO. LTD., 1760 W. 3rd Ave., Van-
couver 9, B.C., CAN
- MARIETTA REPLICA ARMS CO., 706½ Montgomery St.,
Marietta, OH 45750
- MARKETING UNLIMITED, INC., 1 Ranch Rite Rd.,
Yakima, WA 98901
- MARS EQUIPMENT CORP., 3318 W. Devon, Chicago, IL
60645
- MARUBENI AMERICA CORP., 200 Park Ave., New York,
NY 10017
- MAUSER-BAUER INC., 34577 Commerce Rd., Fraser,
MI 48026
- MIIDA (see MARUBENI)
- MUSGRAVE FIREARMS, J. J. SHERBAN & CO., 2655 Har-
rison Ave., S.W., Canton, OH 44706
- NAVY ARMS CO., 689 Bergen Blvd., Ridgefield, NJ
07657
- OMNIPOL, Washingtonova 11, Praha 1, CZECH
- HARRY OWEN, P.O. Box 774, Sunnyvale, CA 94088
- PACHMAYR GUN WORKS, 1220 S. Grand Ave., Los
Angeles, CA 90015 (Fabbri)
- PACIFIC INTL. IMPORT CO., 2416 - 16th St., Sacramento,
CA 91605
- PALMETTO IMP., INC., P.O. Box 4008, Columbia, SC
29204
- PARKER-HALE, Whittall St., Birmingham 4, ENG
- ED PAUL SPTG. GOODS, 172 Flatbush Ave., Brooklyn,
NY 11217 (Premier)
- PRECISE IMP. CORP., (PIC), 3 Chestnut, Suffern, NY
10901
- PREMIER SHOTGUNS, 172 Flatbush Ave., Brooklyn, NY
11217

- J.L. QUICK & SON CO., 1301 Laurence St., Birmingham, AL 35210
- RG INDUSTRIES, INC., 2485 N.W. 20th St., Miami, FL 33142 (Erma)
- RICHLAND ARMS CO., 321 W. Adrian St., Blissfield, MI 49228
- SANDERSON'S, 724 W. Edgewater, Portage, WI 53901
- SAVAGE ARMS CORP., Westfield, MA 01085 (Anschutz)
- SECURITY ARMS CO., 1815 No. Ft. Meyer Dr., Arlington, VA 22209 (Heckler & Koch)
- SERVICE ARMAMENT, 689 Bergen Blvd., Ridgefield, NJ 07657 (Greener Harpoon Gun)
- SHERWOOD DIST., INC., 9470 Santa Monica Blvd., Beverly Hills, CA 90210
- SIMMONS SPEC., INC., 700 Rogers Rd., Olathe, KS 66061
- SKINNER'S GUN SHOP (see ALASKAN RIFLES)
- SLOAN'S SPRTG. GOODS, INC., 88 Chambers St., New York, NY 10001
- SOLINGEN CUTLERY, Box 306, Montrose, CA 91020
- SPESCO CORP., 3540 Browns Mill Rd. S.E., Atlanta, GA 30315
- SPORTEX INTL. LTD., 10389 W. Olympic Blvd., W. Los Angeles, CA 90064
- STOEGER ARMS CO., 55 Ruta Ct., S. Hackensack, NJ 07606
- TRADEWINDS, INC., P.O. Box 1191, Tacoma, WA 98401
- TWIN CITY SPTG. GRDS., 217 Ehrman Ave., Cincinnati, OH 45220
- UNIVERSAL FIREARMS CORP., 3746 E. 10th Ct., Hialeah, FL 33013
- UNIVERSAL ORDNANCE CO., INC., P.O. Box 15723, Nashville, TN 37215 (Krieghoff combination guns)
- VALOR IMP. CORP., 5555 N.W. 36th Ave., Miami, FL 33142
- VOERE (see MARKETING UNLIMITED)

WAFFEN-FRANKONIA, Box 380, 87 Wurzburg, W GER
WEATHERBY'S, 2781 Firestone Blvd., So. Gate, CA
90280 (Sauer)

DAN WESSON ARMS, 293 So. Main, Monson, MA 01057
ZAVODI CRVENA ZASTAVA, 29 Novembra St., No. 12,
Belgrade, YUGOSL.

Gun Parts, U. S. and Foreign

AMERICAN FIREARMS MFG. CO., INC., 1200 Warfield,
San Antonio, TX 78216 (clips)

BADGER SHOOTER'S SUPPLY, Owen, WI 54460

SHELLEY BRAVERMAN, Athens, NY 12015

PHILIP R. CROUTHAMEL, 817 E. Baltimore, E. Lans-
downe, PA 19050

CHARLES E. DUFFY, Williams Lane, West Hurley, NY
12491

FEDERAL ORDNANCE INC., 9634 Alpaca St., So. El
Monte, CA 91733

GREELEY ARMS CO., INC., 223 Little Falls Rd., Fair-
field, NJ 07006

HUNTER'S HAVEN, Zero Prince St., Alexandria, VA
22314

INTERNATIONAL SPORTSMEN'S SUPPLY CO., INC.,
Arapaho-Central Park, Suite 311, Richardson, TX
75080 (bbld. actions)

M. C. MATTHEWS, Box 33095, Decatur, GA 30031
(ctlg. \$1)

NUMRICH ARMS CO., West Hurley, NY 12491

PACIFIC INTL. IMPORT CO., 2416-16th St., Sacramento,
CA 95818

POTOMAC ARMS CORP. (see HUNTER'S HAVEN)

REED & CO., Shokan, NY 12481

MARTIN B. RETTING, INC., 11029 Washington, Culver
City, CA 90230

RUVEL & CO., 3037 N. Clark, Chicago, IL 60614

SARCO, INC., 192 Central, Stirling, NJ 07980
R. A. SAUNDERS, 3253 Hillcrest Dr., San Antonio, TX
78201 (clips)
SHERWOOD DISTR. INC., 7435 Greenbush Ave., No.
Hollywood, CA 91605
SIMMS, 2801 J St., Sacramento, CA 95816
CLIFFORD L. SMIRES, R.D., Columbus, N.J. 08022
(Mauser rifles)
SPORTING ARMS, INC., 9643 Alpaca St., So. El Monte,
CA 91733 (M-1 carb. access.)
N. F. STREBE, 4926 Marlboro Pike, S.E., Washington,
DC 20027
TRIPLE-K MFG. CO., 568-6th Ave., San Diego, CA 92101

Gunsmith Schools

COLORADO SCHOOL OF TRADES, 1545 Hoyt, Denver,
CO 80215
LASSEN JUNIOR COLLEGE, 11100 Main St., Susanville,
CA 96130
OREGON TECHNICAL INSTITUTE, Klamath Falls, OR
97601
PENN. GUNSMITH SCHOOL, 812 Ohio River Blvd.,
Ovklon, Pittsburgh, PA 15202
TRINIDAD STATE JUNIOR COLLEGE, Trinidad, CO
81083

Handgun Accessories

A&R SALES CO., 99163 3/4 Rush St., So. El Monte, CA
91733
BARAMI CORP., 6250 E. 7 Mile Rd., Detroit, MI 48234
(Hip-Grip)
B. L. BROADWAY, 1503 Jasper, Chula Vista, CA 92011
(machine rest)
CASE MASTER, 4675 E. 10 Ave., Miami, FL 33013

- CENTRAL SPECIALTIES CO., 6030 Northwest Hwy.,
Chicago, IL 60631
- JOHN DANGELZER, 3056 Frontier Pl., N.E. Albuquerque,
NM 87106 (flasks)
- BILL DYER, 503 Midwest Bldg., Oklahoma City, OK
73102 (grip caps)
- R. S. FRIELICH, 396 Broome St., New York, NY 10013
(cases)
- HUNT ENG., 121-17th St., Yucaipa, CA 92399 (Multi-
Loader)
- R. G. JENSEN, 16153½ Parthenia, Sepulveda, CA 91343
(auxiliary chambers)
- MATCH LOADER, Box 958, So. Pasadena, CA 91030
(Quick Load)
- J. MCARTHUR, 1961 Overlook Ave., Youngstown, OH
44509 (sling)
- PACHMAYR, 1220 S. Grand, Los Angeles, CA 90015
(cases)
- PLATT LUGGAGE, INC., 2301 S. Prairie, Chicago, IL
60616 (cases)
- JULES REIVER, 4104 Market St., Wilmington, DE 19899
(cases)
- ROGER A. SMITH, 19320 Heber St., Glendora, CA 91740
(Wrist-Loc)
- SPORTSMEN'S EQUIPMENT CO., 415 W. Washington,
San Diego, CA 92103
- M. TYLER, 1326 W. Britton, Oklahoma City, OK 73114
(grip adaptor)

Handgun Grips

- BECKELHYMER'S, Hidalgo & San Bernardo, Laredo,
TX 78040
- CARAY SALES CO., 2044 Hudson St., Ft. Lee, NJ 07024
- CLOYCE'S GUN STOCKS, Box 1133, Twin Falls, ID
83301

CREST CARVING CO., 14849 Dillow St., Westminster,
CA 92683

CUSTOM COMBAT GRIPS, 148 Shepherd Ave., Brooklyn,
NY 11208

ENFORCER PROD. DIV., CARAY SALES CO., 2044 Hud-
son St., Ft. Lee, NJ 07024

J. M. EVANS, 5078 Harwood Rd., San Jose, CA 95124

FITZ, Box 49797, Los Angeles, CA 90049

HERRETT's, Box 741, Twin Falls, ID 83301

HOGUE CUSTOM GRIPS, Box 1001, Cambria, CA 93428

MERSHON CO., INC., 1230 S. Grand Ave., Los Angeles,
CA 90015

MUSTANG PISTOL GRIPS, 13830 Hiway 395, Edge-
mont, CA 92508

SAFETY GRIP CORP., Box 456, Riverside St., Miami,
FL 33135

SANDERSON CUSTOM PISTOL STOCKS, 17695 Fenton,
Detroit, MI 48219

JAY SCOTT, 81 Sherman Place, Garfield, NJ 07026

SILE DIST., 7 Centre Market Pl., New York, NY 10013

SPORTS, INC., 5501 Broadway, Chicago, IL 60640
(Franzite)

JOHN W. WOMACK, 3006 Bibb St., Shreveport, LA
71108

Holsters and Leather Goods

AMERICAN SALES & MFG. CO., P.O. Box 677, Laredo,
TX 78040

BERNS-MARTIN, Box 335, Elberton, GA 30635

BIANCHI HOLSTER CO., 212 W. Foothill Blvd., Mon-
rovia, CA 91016

EDWARD H. BOHLIN, 931 N. Highland Ave., Holly-
wood, CA 90038

BOYT CO., Box 1108, Iowa Falls, IA 51026

- E. A. BRANDIN SADDLE CO., Rte. 2, Box 243-A, Monroe,
LA 71201
- BRAUER BROS. MFG., CO., 817 N. 17th, St. Louis, MO
63106
- BROWNING ARMS CO., Rt. 4, Box 624-B, Arnold, MO
63010
- J. M. BUCHEIMER CO., Airport Rd., Frederick, MD
21701
- COLE'S ACKU-RITE, Box 25, Kennedy, NY 14747
- COLT'S, 150 Huyshope Ave., Hartford, CT 06102
- DAISY MFG. CO., Rogers, AR 72756
- EUGENE DEMAYO & SONS, INC., 2795 Third Ave., Bronx,
NY 10455
- FILMAT ENTERPR., INC., 200 Market St., East Paterson,
NJ 07407
- FLINTROP ARMS CO., 4034 W. National Ave., Mil-
waukee, WI 53215
- GOERG ENT., 3009 S. Laurel, Port Angeles, WA 98362
- HOYT HOLSTER CO., P.O. Box 1783, Costa Mesa, CA
92626
- DON HUME, Box 351, Miami, OK 74354
- THE HUNTER CO., 1215 12th St., Denver, CO 80204
- JET SPORTS CORP., 4 Centre Market Pl., New York, NY
10013
- JUMBO SPORTS PRODS., P.O. Box 280, Airport Rd.,
Frederick, MD 21701
- GEORGE LAWRENCE CO., 306 S.W. First Ave., Port-
land, OR 97204
- MMGR CORP., 5710 12th Ave., Brooklyn, NY 11219
- S. D. MYRES SADDLE CO., Box 9776, El Paso, TX 79988
- PONY EXPRESS SPORT SHOP, 17460 Ventura Blvd.,
Encino, CA 91316
- RED HEAD BRAND CO., 4100 Platinum Way, Dallas, TX
75237
- R. E. ROSEBERRY, 810 W. 38th, Anderson, IN 46014

SAFARILAND LEATHER PRODUCTS, 1946 S. Myrtle Ave., Monrovia, CA 91016

SAFETY SPEED HOLSTER, INC., 910 S. Vail, Montebello, CA 90640

SAN FRANCISCO GUN EXCHANGE, 75 Fourth St., San Francisco, CA 91403

BUDDY SCHOELLKOPF PRODUCTS, INC., 4100 Platinum Way, Dallas, TX 75237

SEVENTREES, LTD., 315 W. 39 St., New York, NY 10018

SILE DISTR., 7 Centre Market Pl., New York, NY 10013

SMITH & WESSON LEATHER CO., 2100 Roosevelt, Springfield, MA 01101

SWISS-CRAFT CO., INC., 33 Arctic St., Worcester, MA 01604

TANDY LEATHER CO., 1001 Foch, Ft. Worth, TX 76107

WHITCO, Box 1712, Brownsville, TX 78520 (Hide-A-Way)

WOODLAND SPORT AND GIFT SHOP, Box 107, Mayfield, NY 12117

Labels, Boxes, Cartridge Holders

MILTON BRYNIN, Box 162, Fleetwood Station, Mount Vernon, NY 10552 (cartridge box labels)

E-Z LOADER, DEL REY PRODUCTS, P.O. Box 91561, Los Angeles, CA 90009

JASCO, J. A. SOMERS CO., P.O. Box 49751, Los Angeles, CA 90049 (cartridge box labels)

LLANERCH GUN SHOP, 2800 Township Line, Upper Darby, PA 19083 (cartridge boxes)

C. W. PADDOCK, SHOOTERS SUPPLIES, 1251 Blair Ave., St. Paul, MN 55104 (cartridge boxes)

PETERSON LABEL CO., P.O. Box 186Z, Redding Ridge, CT 06876 (cartridge box labels; Targ-Dots)

RAMCO, P.O. Box 741, Loveland, CO 80537 (ammo organizer)

N. H. SCHIFFMAN, 963 Malibu, Pocatello, ID 83201
(cartridge carrier)

Metallic Sights

B-SQUARE ENG. CO., Box 11281, Ft. Worth, TX 76110
BO-MAR TOOL & MFG. C9., Box 168, Carthage, TX
75633

MAYNARD P. BUEHLER, INC., 17 Orinda Highway,
Orinda, CA 94563

CHICAGO GUN CENTER, 3109 W. Armitage, Chicago,
IL 60647

CHRISTY GUN WORKS, 875 57th St., Sacramento, CA
95819

CLERKE TECHNICORP., 2040 Broadway Ave., Santa
Monica, CA 90404

ART COOK SUPPLY, Rte. 2, Box 123B, Laurel, MD
20810 (Illum. gunsight)

FIREARMS DEV. LAB., Box 278, Scotts Valley, CA 95060

FREELAND'S SCOPE STANDS, INC., 3734-14th Ave.,
Rock Island, IL 61201

P. W. GRAY CO., Fairgrounds Rd., Nantucket, MA
02554 (shotgun)

LYMAN GUN SIGHT PRODUCTS, Middlefield, CT 06455

MARBLE ARMS CORP., 1120 Superior, Gladstone, MI
49837

MERIT GUNSIGHT CO., P.O. Box 995, Sequim, WA
98382

MICRO SIGHT CO., 242 Harbor Blvd., Belmont, CA
94002

MINIATURE MACHINE CO., 212 E. Spruce, Deming,
NM 88030

OXFORD CORP., 100 Benbro Dr., Buffalo, NY 14225
(Illum, Sight)

C. R. PEDERSEN & SON, Ludington, MI 49431

REDFIELD GUN SIGHT CO., 1315 S. Clarkson St.,
Denver, CO 80210

SCHWARZ'S GUN SHOP, 41-15th St., Wellsburg, WV
26070

SIMMONS GUN SPECIALTIES, INC., 700 Rodgers Rd.,
Olathe, KS 66061

SLUG SITE CO., 3835 University, Des Moines, IA 50311

WILLIAMS GUN SIGHT CO., 7389 Lapeer Rd., Davison,
MI 48423

W. H. WOMACK, 2124 Meriwether Rd., Shreveport, LA
71108

Miscellaneous

ACCURIZING SERVICE, HERBERT G. TROESTER, Ca-
yuago, ND 58013

ADHESIVE FLANNEL, FOREST CITY PROD., 722 Bolivar,
Cleveland, OH 44115

AMMO POUCH, CREED ENT., 13167 E. Garvey Ave.,
Baldwin Park, CA 91706

ARMS BOOKS, NORMOUNT TECHNICAL PUBLICATIONS,
Forest Groove, OR 97116

ARMS BOOKSELLER, NORM FLAYDERMAN, RFD 2,
Squash Hollow, New Milford, CT 06776

ARMS BOOKSELLER, RUTGERS, MARK AZIZ, 127 Raritan
Ave., Highland Park, NJ 08904

ARMS RESEARCH, AMERICAN ARMS CO., 1641 Maple-
crest Dr., Bloomington, IN 47401

BARREL BAND SWIVELS, PHIL JUDD, 83 E. Park St.,
Butte, MT 59701

BARREL BEDDING DEVICE, W. H. WOMACK, 2124 Meri-
wether Rd., Shreveport, LA 71108

BEDDING KIT, BISONITE CO., Box 84, Buffalo, NY 14217

BEDDING KIT, FENWALL, INC., 400 Main St., Ashland,
MA 01721

BENCH REST PEDESTAL, JIM BROBST, 299 Poplar, Ham-
burg, PA 19526

BENCH REST STANDS, SUTER'S, 401 Tejon, Colorado
Springs, CO 80902

- BORE COLLIMATOR, ALLEY SUPPLY CO., Box 458,
Sonora, CA 95370
- BORE COLLIMATOR, COLLINS CO., Box 40, Shep-
herdsville, KY 40165
- BORE LAMP, SPACETRON, INC., Box 84, Broadview,
IL 60155
- BORESCOPE, EDER INST. CO., 2293 N. Clybourn,
Chicago, IL 60614
- BORE SIGHTER, RIFLEMAN'S BORE SIGHTER CO., P.O.
Box 1701, Saginaw, MI 48605
- BREECH PLUG WRENCH, SWAINE MACHINE, 195
O'Connell, Providence, RI 02905
- CAN THROWER, TRIUS PROD., Box 25, Cleves, OH
45002
- CAPPER, MUZZLE-LOADING, PAT BURKE, 3339 Farns-
worth Rd., Lapeer, MI 48446
- CARTRIDGE BOXES, LLANERCH GUN SHOP, 2800
Township Line, Upper Darby, PA 19083
- CARTRIDGE BOXES, SHOOTERS SUPPLIES, 1589 Payne
Ave., St. Paul, MN 55101
- CARTRIDGE BOX LABELS, MILTON BRYNIN, Box 162,
Fleetwood Sta., Mt. Vernon, NY 10552
- CARTRIDGE BOX LABELS, JASCO, Box 49751, Los
Angeles, CA 90049
- CARTRIDGE BOX LABELS, PETERSON LABEL CO., P.O.
Box 186Z, Redding Ridge, CT 06876
- CARTRIDGE CARRIER, N. H. SCHIFFMAN, P.O. Box
7373, Murray, UT 84107
- CASE GAUGE, PLUM CITY BALLISTICS RANGE, Box
128, Plum City, WI 54761
- CHROME BRL. LINING, MARKER MACH. CO., Box 426
Charleston, IL 61920
- COLOR HARDENING, ALAMO HEAT TREATING CO.,
Box 55345, Houston, TX 77055
- CROSSBOWS, MIDWEST CROSSBOW CO., 9043 S. West-
ern, Chicago, IL 60620

- CROW CALLER, WIGHTMAN ELEC. INC., Box 989,
Easton, MD 21601
- CUSTOM BLUING, J. A. WINGERT, 124 W. 2nd St.,
Waynesboro, PA 17268
- E-Z LOADER, DEL REY PROD., P.O. Box 91561, Los
Angeles, CA 90009
- EAR-VALV, SIGMA ENG. CO., 11320 Burbank Blvd., N.
Hollywood, CA 91601
- FLAT SPRINGS, ALAMO HEAT TREATING CO., Box
55345, Houston, TX 77055
- GAS PISTOL, PENGUIN ASSOC., INC., Box 97, Parkes-
burg, PA 19365
- GUN BEDDING KIT, RESIN DIV., FENWAL, INC., 400
Main St., Ashland, MA 01601
- GUN JEWELRY, SID BELL, ORIGINALS, Box 188, Tully,
NY 13159
- GUN JEWELRY, AL POPPER, 614 Turnpike St., Stough-
ton, MA 02072
- GUN LOCK, BOR-LOK PRODS., 4200 California St., San
Francisco, CA 94118
- GUN LOCK, E&C ENTERPRISES, P.O. Box 823, S.
Pasadena, CA 91030
- GUN LOCK CHAIN, LUNDY CORP., 1123-24 Davenport
Bk. Bldg., Davenport, LA 52801
- GUN LOK, 4780 Old Orchard Trail, Orchard Lake,
MI 48034
- GUN SLING, TRAIL GUIDE PRODS. CORP., 15407 McGinty
Rd., Wayzata, MN 55391
- GUN SOCKS COVERS, E&C ENTERPRISES, P.O. Box 823,
S. Pasadena, CA 91030
- GUN SOCKS COVERS, EAST-TENN MILLS, INC., Box 1030,
Johnson City, TN 37601
- HEARING PROTECTOR, AMERICAN OPTICAL CORP.,
Mechanic St., Southbridge, MA 01550 (ear
valve)

- HEARING PROTECTOR, BAUSCH & LOMB, 635 St. Paul St., Rochester, NY 14602
- HEARING PROTECTOR, DAVID CLARK CO., 360 Franklin St., Worcester, MA 01601
- HEARING PROTECTOR, CURTIS SAFETY PROD. CO., Box 61, Webster Sq. Sta., Worcester, MA 01603 (ear valve)
- HEARING PROTECTOR, HODGDON, 7710 W. 50 Hiway, Shawnee Mission, KS 66202
- HEARING PROTECTOR, HUMAN ACOUSTICS, INC., 888 E. Williams St., Carson City, NV 89701
- HEARING PROTECTOR, SIGMA ENG. CO., 11320 Burbank Blvd., No. Hollywood, CA 91601 (Lee-Sinoc ear valve)
- HEARING PROTECTOR, WILLSON PRODS. DIV., P.O. Box 622, Reading, PA 19603
- HOLLOW POINTER, GOERG ENT., 3009 S. Laurel St., Port Angeles, WA 98362
- HULL BAG, D. TITUS, 119 Morlyn, Bryn Mawr, PA 19010
- INSERT BARRELS (22RF), H. OWEN, P.O. Box 774, Sunnyvale, CA 94088
- LEATHER REST-BAGS, B. TULLER, 29 Germania, Galeton, PA 16922
- LIGHTNIN-LOADER, HUNTER MFG. CO., Box 2882, Van Nuys, CA 91404
- MAGAZINE CLIP (COLYER), GREAT NORTHERN TRADING POST, 13001 Hwy. 65 N.E., Rte. 4, Anoka, MN 55303
- MAGAZINE CLIPS, AMER. FIREARMS MFG. CO., INC., 5732 Kenwick Dr., San Antonio, TX 78238
- MINIATURE GUNS, C. H. STOPPLER, 1426 Walton Ave., New York, NY 10452
- MONTE CARLO PAD, FRANK A. HOPPE DIV., P.O. Box 97, Parkesburg, PA 19365

- NIPPLE WRENCHES, CHOPIE TOOL & DIE CO., 531
Copeland Ave., La Crosse, WI 54601
- PELL REMOVER, A. EDW. TERPENING, 838 W. Dar-
lington Rd., Tarpon Springs, FL 33589
- PERSONAL FIREARMS RECORD BOOK, Box 201, Park
Ridge, IL 60068
- PORTABLE GUN REST, CENTRAL SPECIALTIES CO., 630
Northwest Hwy., Chicago, IL 60631 (Gun-Rak)
- POWDER HORNS, THOS. F. WHITE, 5801 Westchester
Ct., Worthington, OH 43085
- PRESSURE TESTING MACHINE, YORK-CANTRELL, INC.,
30241 Rosebriar, St. Clair Shores, MI 48082
- RECOIL PADS, ETC., MERSHON CO., INC., 1230 S. Grand,
Los Angeles, CA 90015
- RECOIL REDUCER, J. B. EDWARDS, 269 Herbert St.,
Alton, IL 62002
- RIFLE REST, EDW. L. BAGROSKY, 13451 Philmont Ave.,
Philadelphia, PA 19116
- RIFLE RESTS, E. L. BEECHER, 2155 Demington Dr.,
Cleveland Hgts, OH 44106
- RIFLE RESTS, COLE'S ACKU-RITE PROD., Box 25,
Kennedy, NY 14747
- RIFLES RESTS, E-N GUN PROD., 1015 Van Hoy Ave.,
Winston-Salem, NC 27104
- RIFLE RESTS, FRONTIER ARMS, INC., Box 2593, Chey-
enne, WY 82001
- RIFLE RESTS, THE GUN CASE, 11035 Maplefield, El
Monte, CA 91733
- RIFLE RESTS, HARRIS ENGR., INC., Box 305, Fraser,
MI 48026 (bipods)
- RIFLE RESTS, ROB. W. HART & SON, 401 Montgomery
St., Nescopeck, PA 18635
- RIFLE RESTS, REC. PRODS, RES., INC., 158 Franklin
Ave. Ridgewood, NJ 07450 (Buttspipod)
- RIFLE RESTS, TEN RING MFG. CO., Box 157, New City,
NY 10956 (Rifle-Mate)

- RIFLE RESTS, BASIL TULLER, 29 Germania, Galeton,
PA 15922 (Protektor sandbags)
- RIFLE RESTS, W. H. WOMACK, 2124 Meriwether Rd.,
Shreveport, LA 71108
- RIFLE SLINGS, BIANCHI, 212 W. Foothill Blvd., Mon-
rovia, CA 91016
- RIG, NRA SCORING PLUG, RIG PROD. CO., Box 279,
Oregon, IL 60161
- RUBBER CHEEKPIECE, W. H. LODEWICK, 2816 N.E.
Halsey, Portland, OR 97232
- RUST BLUING/BROWNING, L. B. THOMPSON, 568 E.
School Ave., Salem, OH 44460
- SAFETIES, DOC LINE CO., 18440 John R. St., Detroit,
MI 48203
- SAFETIES, WILLIAMS GUN SIGHT CO., 7389 Lapeer
Rd., Davison, MI 48423
- SALUTE CANNONS, NAVAL CO., Rt. 611, Doylestown,
PA 18901
- SCOPE SAFETIES, W. H. LODEWICK, 2816 N.E. Halsey,
Portland, OR 97232
- SHARPENING STONES, RUSSELL'S ARKANSAS OIL-
STONES, P.O. Box 474, Fayetteville, AR 72701
- SHOOTING/TESTING GLASSES, CLEAR VIEW SPORTS
SHIELDS, P.O. Box 255, Wethersfield, CT 06107
- SHOOTING GLASSES, BUSHNELL OPTICAL CORP., 2828
E. Foothill Blvd., Pasadena, CA 91107
- SHOOTING GLASSES, M. B. DINSMORE, Box 21, Wyo-
missing, PA 19610
- SHOOTING GLASSES, MITCHELL'S BOX 539, Waynes-
ville, MO 65583
- SHOOTING RANGES, SHOOTING EQUIP. INC., 2001 N.
Parkside Ave., Chicago, IL 60639
- SHOTGUN RECOIL KIT, CHB, 3063 Hiram, Wichita, KS
67217
- SHOTGUN SIGHT, BINOCULAR, TRIUS PROD., Box 25,
Cleves, OH 45002

- SHOTSHELL CATCHER, OLD MILL TRAP & SKEET, 300 Mill Ridge Rd., Secaucus, NJ 07094 (Seymour)
- SHOTSHELL POUCHES, FILMAT ENTERPR., INC., 200 Market St., East Paterson, NJ 07407
- SILVER GRIP CAPS, BILL DYER, P.O. Box 75255, Oklahoma City, OK 73107
- SLIDE SAFETY (MAUSERS), DOC LINE CO., 18440 John R., Detroit, MI 43203
- SNAP CAPS, FILMAT, 200 Market, East Paterson, NJ 07407
- SPRINGFIELD SAFETY PIN, B-SQUARE CO., P.O. Box 11281, Ft. Worth, TX 76110
- SPRINGS, W. WOLFF CO., Box 232, Ardmore, PA 19003
- SWIVELS, MICHAELS, P.O. Box 13010, Portland, OR 97213
- SWIVELS, SILE DIST., 7 Centre Market Pl., New York, NY 10013
- SWIVELS, WILLIAMS GUN SIGHT, 7389 Lapeer, Davison, MI 48423
- TARG-DOTS, PETERSON LABEL CO., P.O. Box 186Z, Redding Ridge, CT 06876
- TEENUTS, DOT PRODUCTS SUPPLY CO., 10544 Lunt Ave., Rosemont, IL 60018
- TRAP, CLAYBIRD, DEERBACK PROD., 8239 Hayle Ave., Dallas, TX 75227
- TRAP, CLAYBIRD, OUTERS LAB., INC., Box 37, Onalaska, WI 54650
- TRAP, CLAYBIRD, TRIUS PROD., Box 25, Cleves, OH 45002
- TRIGGERS, CANJAR RIFLE ACC., 500 E. 45th St., Denver, CO 80216
- TRIGGER GUARDS, BEESLEY MFG. CO., P.O. Box 17075, Salt Lake City, UT 84117 (Bee-Safe)
- TRIGGER GUARDS, MICHAELS, P.O. Box 13010, Portland, OR 97213

TRIGGER PULL GAUGE, OHAUS, 29 Hanover Rd.,
Florham Park, NJ 07932

TRIGGER RELEASE, SCHWAB GUN SHOP, 1103 E.
Bigelow, Findlay, OH 45840

TRIGGER SHOE, FLAIGS, Babcock Blvd., Millvale, PA
15209

TRIGGER SHOE, PACIFIC TOOL CO., Box 4495, Lincoln,
NE 68504

TRIGGER SHOW, MELVIN TYLER, 1326 W. Britton,
Oklahoma City, OK 73114

WORLDHUNTING INFO., JACK ATCHESON, 2309 Han-
cock Ave., Butte, MT 59701

Pistolsmiths

ALAMO HEAT TREATING, Box 55345, Houston, TX
77055

ALLEN ASSOC, 7448 Limekiln Pike, Philadelphia, PA
19138 (speed-cock lever for 45 ACP)

BAIN & DAVIS SPORTING GOODS, 559 W. Las Tunas
Dr., San Gabriel, CA 91776

BEHLERT & FREED, INC., 33 Herning Ave., Cranford,
NJ 07016 (short actions)

R. M. CHAMPLIN, Stanyan Hill, Wentworth, NH 03282

F. BOB CHOW, GUN SHOP, 3185 Mission, San Fran-
cisco, CA 94110

J. E. CLARK, 7424 Broadacres Rd., Shreveport, LA
71109

CUSTOM GUNSHOP, 33 Herning Ave., Cranford, NJ
07016

DAY ARMS CORP., 7515 Stagecoach Lane, San Antonio,
TX 78227

ALTON S. DINAN, JR., P.O. Box 6674, Canaan, CT 06018

DAN DWYER, 915 W. Washington, San Diego, CA
92103

GILES' 45 SHOP, Rt. 1, Box 47, Odessa, FL 33556

H. H. HARRIS, 1237 S. State, Chicago, IL 60605

- GIL HEBARD GUNS, Box 1, Knoxville, IL 61448
 MACS ACCURACY SERV., 3260 Lakewood, So. Seattle,
 WA 98144 (45 ACP)
 RUDY MARENT, 9711 Tiltree, Houston, TX 77034
 (Hammerli)
 MARYLAND GUN EXCHANGE, INC., Rte. 40 W., RD 5,
 Frederick, MD 21701
 MATCH ARMS CO., 831 Mary St., Springdale, PA 15144
 PACHMAYR GUN WORKS, 1220 S. Grand Ave., Los
 Angeles, CA 90015
 GEO. E. SHELDON, 7 Balsam St., Keene, NH 03431
 R. L. CHOCKEY GUNS, INC., 1614 S. Choctaw, E. Reno,
 OK 73036
 SILVER DOLLAR GUNS, 7 Balsam St., Keene, NH
 03431 (45 auto only)
 SPORTSMENS EQUIP. CO., 915 W. Washington, San
 Diego, CA 92103
 ARMAND D. SWENSON, 3223 W. 145th St., Gardena,
 CA 90249

Rests — Bench, Portable, etc.

- BAUSCH & LOMB, 635 St. Paul St., Rochester, NY
 14602 (rifle rest)
 GENE BEECHER PRODS., 2155 Demington Dr., Cleve-
 land Hgts., OH 44106
 JIM BROBST, 299 Poplar St., Hamburg, PA 19526 (bench
 rest pedestal)
 C'ARCO, P.O. Box 2043, San Bernardino, CA 92401
 (Ransom handgun rest)
 CENTRAL SPECIALTIES CO., 630 Northwest Hwy.,
 Chicago, IL 60631 (portable gun rest)
 COLE'S ACKU-RITE PROD., Box 25, Kennedy, NY 14747
 F & H MACHINING, 4645 Cambio Ct., Fremont, CA
 94536
 THE FERGUSONS, 27 W. Chestnut St., Farmingdale, NY
 11735 (rifle rests)

- FRONTIER ARMS, INC., 420 E. Riding Club Rd., Cheyenne, WY 82001
- THE GUN CASE, 11035 Maplefield, El Monte, CA 91733
- HARRIS ENGR., INC., Box 305, Fraser, MI 48026 (bi-pods)
- ROB. W. HART & SON, 401 Montgomery St., Nescopeck, PA 18635
- NORTH STAR DEVICES, INC., P.O. Box 2095, North St. Paul, MN 55109 (Gun Slinger)
- PORTO/SHOOTING BENCH, UNIVERSAL STD. PRODS., 926 N. Memorial, Racine, WI 53404
- REC. PRODS, RES., INC., 158 Franklin Ave., Ridgewood, NJ 07450 (Butts Pipod)
- SUTER'S, 332 Tejon, Colorado Springs, CO 80902
- BASIL TULLER, 29 Germania, Galeton, PA 16922 (Protectektor sandbags)
- WALDEN LEISURE PRODS., 1040 Matley Lane, Bldg. 4, Reno, NV 89502 (bench rest accessory case; portable bench)
- W. H. WOMACK, 2124 Meriwether Rd., Shreveport, LA 71108

Reloading Tools and Accessories

- ACME IND. INC., Box 101, Kaukauna, WI 54130 (loader & wingtraps)
- ALCAN, (see SMITH & WESSON Arms CO.)
- ALPHA-MOLYKOTE, DOW CORNING CORP., 45 Commerce, Trumbull, CT 06601
- ANCHOR ALLOYS, INC., 966 Meeker Ave., Brooklyn, NY 11222 (chilled shot)
- ANCHOR PLASTICS, INC., P.O. Box 300, Logansport, IN 46947
- ANDERSON MFG. CO., Royal, IA 51357 (Shotshell Trimmers)
- AURANDS, 229 E. 3rd St., Lewistown, PA 17044
- B-SQUARE ENG. CO., Box 11281, Ft. Worth, TX 76110

- BAHLER DIE SHOP, Box 386, Florence, OR 97439
- BAIR MACHINE CO., Box 4407, Lincoln, NE 68504
- BILL BALLARD, P.O. Box 656, Billings, MT 59103
- BELDING & MULL, P.O. Box 428, Philipsburg, PA 16866
- BELMONT PRODS., Rte. 1, Friendsville, TN 37737
(lead cutter)
- H. S. BEVERAGE, New Gloucester, ME 04260 (brass
bullet mould)
- BLACKHAWK SAA EAST, K2274 POB, Loves Park, IL
61111
- BLACKHAWK SAA WEST, Box 285, Hiawatha, KS 66434
- BONANZA SPORTS, INC., 412 Western Ave., Faribault,
MN 55021
- GENE BOWLIN, 3602 Hill Ave., Snyder, TX 79549
(arbor press)
- BROWN PRECISION CO., 5869 Indian Ave., San Jose,
CA 95123 (Little Wiggler)
- A. V. BRYANT, 72 Whiting Rd., East Hartford, CT 06118
(Nutmeg Universal Press)
- C-H TOOL & DIE CORP., Box L, Owen, WI 54460
- CAMDEX, INC., 18619 W. Seven Mile Rd., Detroit, MI
48219
- CARBIDE DIE & MFG. CO., Box 226, Covina, CA 91706
- CARTER GUN WORKS, 2211 Jefferson Pk. Ave., Char-
lottesville, VA 22903
- CASCADE CARTRIDGE, INC. (see OMARK)
- CLYMER MFG. CO., 14241 W. 11 Mile Rd., Oak Park,
MI 48237 (1/2-jack. swaging dies)
- LESTER COATS, 416 Simpson St., No. Bend, OR 97459
(core cutter)
- COLE'S ACKU-RITE PROD., P.O. Box 25, Kennedy, NY
14747 (die racks)
- CONTAINER DEVELOPMENT CORP., 424 Montgomery
St., Watertown, WI 53094
- CONTINENTAL KITE & KEY CO., Box 40, Broomall, PA
19008 (primer.pocket cleaner)

- COOPER-WOODWARD, Box 972, Riverside, CA 92502
(Perfect Lube)
- J. DEWEY GUN CO., Clinton Corners, NY 12514 (bullet
spinner)
- DIVERTER ARMS, INC., 6520 Rampart St., Houston, TX
77036 (bullet puller)
- DIVISION LEAD CO., 7742 W. 61st Pl., Summit, IL
60502
- EAGLE PRODUCTS CO., 1520 Adelia Ave., So. El Monte,
CA 91733
- W. H. ENGLISH, 4411 S. W. 100th, Seattle, WA 98146
(Paktool)
- FARMER BROS. MFG. CO., 1102 Washington St., Eldora,
IA 50627 (Lage wads)
- THE FERGUSONS, 27 W. Chestnut St., Farmingdale,
NY 11735
- FITZ, Box 49797, Los Angeles, CA 90049 (Fitz Flipper)
- FLAMBEAU PLASTICS, 801 Lynn, Baraboo, WI 53913
- FORSTER-APPELT MFG. CO., INC., 82 E. Lanark Ave.,
Lanark, IL 61046
- GENE'S GUN SHOP, 3602 Hill Ave., Snyder, TX 79549
(arbor press)
- JOHN R. GILLETTE, 4514 W. 123d Place, Alsip, IL
60658
- GOERG ENTERPRISES, 3009 S. Laurel, Port Angeles,
WA 98362 (hollow pointer)
- GOPHER SHOOTER'S SUPPLY, Box 246, Faribault, MN
55021
- GRIFFIN SHOOTER'S SUPPLIES, 7801-A9 Hillmont,
Houston, TX 77040 (Electric operator for MEC
tools)
- THE GUN CLINIC, 81 Kale St., Mahtomedi, MN 55115
- HART PRODUCTS, 401 Montgomery St., Nescopeck, PA
18635
- ED HART, U.S. Rte. 15, Cohocton, NY 14826 (Meyer
shotgun slugs)

- FRANK A. HEMSTED, Box 281, Sunland, CA 91040
(swage dies)
- HENSLEY & GIBBS, Box 10, Murphy, OR 97533
- E. C. HERKNER CO., Box 5007, Boise, ID 83702
- HERTER'S INC., RR1, Waseca, MN 56093
- B. E. HODGDON, INC., 7710 W. 50 Hiway, Shawnee
Mission, KS 66202
- HOLLYWOOD RELOADING, see: WHITNEY SALES, INC.
- HULME FIREARM SERV., Box 83, Millbrae, CA 94030
(Star case feeder)
- HUNTER BRADLEE CO., 2800 Routh St., Dallas, TX
75201 (powder measure)
- INDEPENDENT MACH. & GUN SHOP, 1416 N. Hayes,
Pocatello, ID 83201
- JASCO, Box 49751, Los Angeles, CA 90049
- J & G RIFLE RANCH, Turner, MT 59542 (case tumblers)
- JAVELINA PRODUCTS, Box 337, San Bernardino, CA
92402 (Alox beeswax)
- KEXPLORE, Box 22084, Houston, TX 77027
- KUHARSKY BROS., 2425 W. 12th, Erie, PA 16500
(primer pocket cleaner)
- KUSH PLASTICS, P.O. Box 366, Palatine, IL 60067
(shotshell wads)
- LACHMILLER ENG. CO., 11273 Goss St., Sun Valley, CA
91352
- LAGE UNIVERSAL SHOTSHELL WAD, (see FARMER
BROS.)**
- LANDAV, 7213 Lee Highway, Falls Church, VA 22046
(X-15 bullet puller)
- LEE ENGINEERING, 21 E. Wisconsin St., Hartford, WI
53027
- LEON'S RELOADING SERVICE, 3945 No. 11 St., Lincoln,
NE 68521
- L. L. F. DIE SHOP, 1281 Highway 99 N., Eugene, OR
97402

- LJUTIC INDUSTRIES, 918 N. 5th Ave., Yakima, WA 98902
- LOCK'S PHILA. GUN EXCH., 6700 Rowland, Philadelphia, PA 19149
- J. T. LOOS, P.O. Box 41, Pomfret, CT 06258 (primer pocket cleaner)
- LYMAN GUN SIGHT PRODUCTS, Middlefield, CT 06455
- MCKILLEN & HEYER, Box 627, Willoughby, OH 44094 (case gauge)
- PAUL MCLEAN, 2670 Lakeshore Blvd., W., Toronto 14, Ont., CAN (Universal Cartridge Holder)
- PAT B. MCMILLAN, 1828 E. Campo Bello Dr., Phoenix, AZ 85022
- MTM MOLDED PROD., 5680 Webster St., Dayton, OH 45414
- MAGMA ENG. CO., P.O. Box 881, Chandler, AZ 85224
- MAYVILLE ENG. CO., 715 South St., Mayville, WI 53050 (shotshell loader)
- MERIT GUN SIGHT CO., P.O. Box 995, Sequim, WA 98382
- MINNESOTA SHOOTERS SUPPLY, 1915 E. 22nd St., Minneapolis, MN 55404
- MURDOCK LEAD CO., Box 5298, Dallas, TX 75222
- NATIONAL LEAD CO., Box 831, Perth Amboy, NJ 08861
- NORMINGTON CO., Box 156, Rathdrum, ID 83858 (powder baffles)
- OHAUS SCALE CORP., 29 Hanover Rd., Florham Park, NJ 07932
- OMARK-CCI, INC., Box 856, Lewiston, ID 83501
- PACIFIC TOOL CO., P.O. Drawer 2048, Ordnance Plant Rd., Grand Island, NB 68801
- C. W. PADDOCK SHOOTERS SUPPLIES, 1251 Blair Ave., St. Paul, MN 55101 (cartridge boxes)
- PAK-TOOL CO., 4411 S.W. 100th, Seattle, WA 98146

- PATTERN PERFECT, P.O. Box 366, Palatine, IL 60067
(shotshell wads)
- PERFECTION DIE CO., 1614 S. Choctaw, El Reno, OK
73036
- PERSONAL FIREARMS RECORD BOOK, Box 201, Park
Ridge, IL 60068
- FERRIS PINDELL, R.R. 3, Box 205, Connersville, IN
47331 (bullet spinner)
- PLUM CITY BALLISTICS RANGE, Box 29C, Plum City,
WI 54761
- PONSNESSE-WARREN, INC., P.O. Box 861, Eugene, OR
97401
- POTTER ENG. CO., 1410 Santa Ana Dr., Dunedin, FL
33528 (electric pots only)
- MARIAN POWLEY, 19 Sugarplum Rd., Levittown, PA
10956
- QUINETICS CORP., 3740 Colony Dr., San Antonio, TX
78230 (kinetic bullet puller)
- RCBS, INC., Box 1919, Oroville, CA 95965
- REDCO, Box 15523, Salt Lake City, UT 84115
- REDDING-HUNTER, INC., 114 Starr Rd., Cortland, NY
13045
- REMCO, 1404 Whitesboro St., Utica, NY 13502 (shot
caps)
- RIFLE RANCH, Rte. 1, Prescott, AZ 86301
- ROCHESTER LEAD WORKS, Rochester, NY 14608 (lead-
wire)
- RORSCHACH PRECISION PRODS., P.O. Box 1613, Irving,
TX 75060
- ROTEX MFG. CO. (see TEXAN)
- RUHR-AMERICAN CORP., So. East Hwy. 55, Glenwood,
MN 56334
- SAECO REL. INC., P.O. Box 778, Carpinteria, CA 93013
- SAVAGE ARMS CO., Westfield, MA 01085
- SCIENTIFIC LUBRICANTS CO., 3753 Lawrence Ave.,
Chicago, IL 60625

SHILO IV, INC., 173 Washington Pl., Hasbrouck Heights,
NJ 07604 (4-cavity bullet mould)

SHOFFSTALLS MFG. CO., 740 Ellis Place, E. Aurora,
NY 14052

SHOOTERS ACCESSORY SUPPLY, Box 250, N. Bend, OR
97459 (SAS)

SHOOTERS SERV. & DEWEY, INC., Clinton Corners, NY
12514 (SS&D) (bullet spinner)

SIL'S GUN PROD., 490 Sylvan Dr., Washington, PA
15301 (K-spinner)

JERRY SIMMONS, 713 Middlebury St., Goshen, IN
46526 (Pope de- & recapper)

ROB. B. SIMONSON, Rte 7, 2129 Vanderbilt Rd., Kalamazoo, MI 49002

SMITH & WESSON AMMUNITION CO., INC., 3640 Seminary Rd., Alton, IL 62002

J. A. SOMERS CO., P.O. Box 49751, Los Angeles, CA
90049 (Jasco)

STAR MACHINE WORKS, 418 10th Ave., San Diego, CA
92101

SULLIVAN ARMS CORP., see: ANCHOR PLASTICS

TEXAN RELOADERS, INC., P.O. Box 5355, Dallas, TX
75222

VAMCO, Box 67, Vestal, NY 13850

W. S. VICKERMAN, 505 W. 3rd Ave., Ellensburg, WA
98926

WALKER MFG. INC., 8296 So. Channel, Harsen's
Island, MI 48028 (Berdan decapper)

WEATHERBY, INC., 2781 Firestone Blvd., South Gate,
CA 90280

WEBSTER SCALE MFG. CO., Box 188, Sebring, FL 33870

WHITNEY CARTRIDGE CO., P.O. Box 608, Cortez, CO
81321 (shotshells)

WHITNEY SALES, INC., P.O. 875, Reseda, CA 91335
(Hollywood)

L. E. WILSON, INC., Box 324, Cashmere, WA 98815

XELEX, LTD., Hawksbury, Ont., CAN (powder)

ZENITH ENT., RFD, Nordland, WA 98358

A. ZIMMERMAN, 127 Highland Trail, Denville, NJ
07834 (case trimmer)

Rifle Barrel Makers

P. O. ACKLEY, P.O. Box 17347, Salt Lake City, UT
84117

APEX RIFLE CO., 7628 San Fernando, Sun Valley, CA
91352

CHRISTY GUN WORKS, 875 57th St., Sacramento, CA
95819

CLERKE TECHNICORP., 2054 Broadway Ave., Santa
Monica, CA 90404

CUTHBERT GUN SHOP, 715 S. 5th Coos Bay, OR 97420

J. DEWEY GUN CO., Clinton Corners, NY 12514

DOUGLAS BARRELS, INC., 5504 Big Tyler Rd., Charles-
ton, WV 25312

FEDERAL FIREARMS CO., INC., Box 145, Oakdale, PA
15071 (star bbls., actions)

A. R. GOODE, 3306 Sellman Rd., Adelphi, MD 20783

HART RIFLE BARRELS, INC., RD 2, Lafayette, NY 13084

WM. H. HOBAUGH, Box 657, Phillipsburg, MT 59858

HOFFMAN RIFLE BARREL CO., Bucklin, KS 67834

INTERN'L CASTING CO., 19453 Forrer, Detroit, MI
48235

JOHNSON AUTOMATICS, Box 306, Hope Valley, RI
02832

LES' GUN SHOP, Box 511, Kalispell, MT 59901

MCGOWEN RIFLE BARRELS, Rte. 3, St. Anne, IL 60964

NAUMAN GUN SHOP, 1048 S. 5th, Douglas, WY 82633

NU-LINE GUNS, INC., 3727 Jennings Rd., St. Louis,
MO 63121

NUMRICH ARMS., W. Hurley, NY 12491

BOB PARKS, Gettysburg, PA 17325

RHEINMETALL (see JOHN WEIR)

SS&D, INC., Clinton Corners, NY 12514 (cold-formed
bbls.)

SANDERS CUST. GUN SERV., 2358 Tyler Lane, Louis-
ville, KY 40205

SHARON RIFLE BARREL CO., P.O. Box 106, Kalispell,
MT 59901

ED SHILEN RIFLES, 4510 Harrington Rd., Irving, TX
75060

TITUS BARREL & GUN CO., Box 151, Heber City, UT
84032

JOHN E. WEIR, 4301 Cottage, Independence, MO
64055

WILSON ARMS, Box 364, Stony Creek, Branford, CT
06405

Scopes, Mounts, Accessories, Optical Equipment

ALLEY SUPPLY CO., P.O. Box 458, Sonora, CA 95370
(scope collimator)

AMERICAN IMPORT CO., 1167 Mission, San Francisco,
CA 94103

ANDERSON & CO., 1203 Broadway, Yakima, WA 98902
(lens cap)

BAUSCH & LOMB INC., 635 St. Paul St., Rochester, NY
14602

BRIDGE MOUNT CO., Box 3344, Lubbock, TX 79410
(one-piece target mts.)

BROWNING ARMS, Rt. 4, Box 624-B Arnold, MO 63010

MAYNARD P. BUEHLER, INC., 17 Orinda Hwy., Orinda,
CA 94563

BULLITCO, Box 40 Shepherdsville, KY 40165 (scope
collimator)

D. P. BUSHNELL & CO., INC., 2828 E. Foothill Blvd.,
Pasadena, CA 91107

KENNETH CLARK, 18738 Highway 99, Madera, CA
93637

- COLLINS CO., Box 40, Shepherdsville, KY 40165 (Scope collimator)
- COLT's, Hartford, CT 06102
- CONETROL, Hwy. 123 South, Seguin, TX 78155
- CONTINENTAL ARMS CORP., 697-5th Ave., New York, NY 10022 (Nickel)
- DON'S GUN SHOP, 128 Ruxton, Manitou Springs, CO 80829 (claw mtg. 0 rings)
- DUO-GUN PROD., 3213 Partridge Ave., Oakland, CA 94605 (mount)
- FLAIG's, Babcock Blvd., Millvale, PA 15209
- FREELAND'S SCOPE STANDS, INC., 3734 14th, Rock Island, IL 61201
- BERT FRIEDBERG & CO., 820 Mission St., San Francisco, CA 94103
- GRIFFIN & HOWE, INC., 589-8th Ave., New York, NY 10017
- E. C. HERKNER CO., Box 5007, Boise, ID 83702
- HERTER'S INC., Waseca, MN 56093
- J. B. HOLDEN CO., Box H-1495, Plymouth, MI 48170 (Ironsighter)
- THE HUTSON CORP., P.O. 1127, Arlington, TX 76010
- HY-SCORE ARMS CORP., 200 Tillary St., Brooklyn, NY 11201
- PAUL JAEGER, 211 Leedom St., Jenkintown, PA 19046 (Nickel)
- JANA INTL. CO., Box 1107, Denver, CO 80201
- JASON EMPIRE, 1211 Walnut, Kansas City, MO 64106
- KESSELRING GUN SHOP, Box 350, Rt. 1, Burlington, WA 98283
- KUHARSKY BROS., 2425 W. 12th St., Erie, PA 16500
- KWIK-SITE, 27367 Michigan, Inkster, MI 48141 (rings)
- T. K. LEE, Box 2123, Birmingham, AL 35201 (reticles)
- E. LEITZ, INC., Rockleigh, NJ 07647
- LEUPOLD & STEVENS INC., P.O. Box 688, Beaverton, OR 97005

- JAKE LEVIN & SON, INC., 1211 Walnut, Kansas City,
MO 64106
- LYMAN GUN SIGHT PRODUCTS, Middlefield, CT 06455
- MARBLE ARMS CO., 1120 Superior St., Gladstone, MI
49837
- MARLIN FIREARMS CO., 100 Kenna Dr., New Haven,
CT 06473
- MASHBURN ARMS CO., 112 W. Sheridan, Oklahoma
City, OK 73102
- O. F. MOSSBERG & SONS, INC., 7 Grasso Ave., North
Haven, CT 06473
- NORMARK CORP., 1710 E. 78th St., Minneapolis, MN
55423 (single-point)
- NUMRICH ARMS, West Hurley, NY 12491
- NYDAR DIV., SWAIN NELSON CO., Box 45, Glenview,
IL 60025 (shotgun sight)
- PGS, PETERS' INC., 622 Gratiot Ave., Saginaw, MI
48602 (scope shields)
- R. J. ENOREC INC., 175 N. 5th St., Saddle Brook, NJ
07662 (bullet mold)
- PACHMAYR GUN WORKS, 1220 S. Grand Ave., Los
Angeles, CA 90015
- PACIFIC TOOL CO., Box 4495, Lincoln, NE 68504
- PRECISE IMPORTS CORP., 3 Chestnut, Suffern, NY
10901 (PIC)
- PREMIER RETICLES, Ocala, FL 32670
- RANGING INC., P.O. Box 9106, Rochester, NY 14625
- REALIST, INC., N. 93 W. 16288, Megal Dr., Meno-
monee Falls, WI 53051
- REDFIELD GUN SIGHT CO., 5800 E. Jewell Ave., Den-
ver, CO 80222
- S&W MFG. CO., Box 247, Pittsburgh, PA 16340 (Insta-
mount)
- SAVAGE ARMS, Westfield, MA 01085
- SCOPE INST. CO., 25-20 Brooklyn-Queens Expressway
West, Woodside, NY 11377

SOUTHERN PRECISION INST. CO., 710 Augusta St., San Antonio, TX 78215

STOEGER ARMS CO., 55 Ruta Ct., S. Hackensack, NJ 07606

SWIFT INSTRUMENTS, INC., 952 Dorchester Ave., Boston, MA 02125

TASCO, 1075 N.W. 71st, Miami, FL 33138

THOMPSON-CENTER ARMS, P.O. Box 2405, Rochester, NH 03867 (handgun scope)

TRADEWINDS, INC., Box 1191, Tacoma, WA 98401

JOHN UNERTL OPTICAL CO., 3551-5 East St., Pittsburgh, PA 15215

UNIVERSAL FIREARMS CORP., 3746 E. 10th Ct., Hialeah, FL 33013

VISSING CO., Box 437, Idaho Falls, ID 83401 (lens cap)

WEATHERBY'S, 2781 Firestone, South Gate, CA 90280

W. R. WEAVER CO., 7125 Industrial Ave., El Paso, TX 79915

WILLIAMS GUN SIGHT CO., 7389 Lapeer Rd., Davison, MI 48423

CARL ZEISS, INC., 444 Fifth Ave., New York, NY 10018 (Hensoldt)

Surplus Guns, Parts, and Ammunition

ALLIED ARMS LTD., 655 Broadway, New York, NY 10012

CENTURY ARMS, INC., 3-5 Federal St., St. Albans, VT 05478

W. H. CRAIG, Box 927, Selma, AL 36701

CUMMINGS INTL. INC., 41 Riverside Ave, Yonkers, NY 10701

EASTERN FIREARMS CO., 790 S. Arroyo Pkwy., Pasadena, CA 91105

FENWICK'S, P.O. Box 38, Weisburg, Whitehall, MD 21161

- HUNTER'S LODGE, 200 S. Union, Alexandria, VA 22313
LEVER ARMS SERV. LTD., 771 Dunsmuir St., Vancouver,
B.C., Canada
MARS EQUIPMENT CORP., 3318 W. Devon, Chicago, IL
60645
NATIONAL GUN TRADERS, 251-55 W. 22nd, Miami, FL
33135
PACIFIC INTL. IMP. CO., 2416-16th St., Sacramento, CA
95818
PLAINFIELD ORDNANCE CO., Box 447, Dunellen, NJ
08812
POTOMAC ARMS CORP., Box 35, Alexandria VA 22313
RUVEL & CO., 3037 N. Clark St., Chicago, IL 60614
SERVICE ARMAMENT CO., 689 Bergen Blvd., Ridgefield,
NJ 07657
SHERWOOD DISTR. INC., 9470 Santa Monica Blvd.,
Beverly Hills, CA 90210
Z.M. MILITARY RESEARCH CO., 9 Grand Ave., Engle-
wood, NJ 07631

Targets, Bullet and Claybird Traps

- BLACK PRODUCTS CO., 13513 Calumet Ave., Chicago,
IL 60627
CASWELL TARGET CARRIERS, Box 344, Anoka, MN
55303
COLE'S ACKU-RITE PROD., Box 25, Kennedy, NY 14747
(Site Rite targets)
DETROIT BULLET TRAP CO., 2233 N. Palmer Dr.,
Schaumburg, IL 60172
ELECTRO BALLISTIC LAB., P.O. Box 5876, Stanford, CA
94305 (Electronic Trap Boy)
ELLWOOD EPPS (ORILLIA) LTD., Hwy. 11 North,
Orillia, ONT., Canada (hand traps)
GOPHER SHOOTER'S SUPPLY, Box 246, Faribault, MN
55021 (Lok-A-Leg target holders)

- MILLARD F. LERCH, Box 163, 10842 Front St., Mokena, IL 60448 (bullet target)
- NATIONAL TARGET CO., 4960 Wyaconda Rd., Rockville, MD 20853
- OUTERS LABORATORIES, INC., Onalaska, WI 54650 (claybird traps)
- PETERSON LABEL CO., P.O. Box 186Z, Redding Ridge, CT 06876 (paste-ons)
- PROFESSIONAL TAPE CO., 355 E. Burlington Rd., Riverside, IL 60546 (Time Labels)
- RANGER ARMS CO., Box 704, Gainesville, TX 76240 (paper targets)
- RECREATION PRODS. RES. INC., 158 Franklin Ave., Ridgwood, NJ 07450 (Butts bullet trap)
- REMINGTON ARMS CO., Bridgeport, CT 06602 (claybird traps)
- SCIENTIFIC PROD. CORP., 426 Swann Ave., Alexandria, VA 22301 (Targetter)
- SHERIDAN PRODUCTS, INC., 3205 Sheridan, Racine, WI 53403 (traps)
- SHOOTING EQUIP. INC., 2001 N. Parkside Ave., Chicago, IL 60639 (electric range)
- STERLING-FLEISCHMAN INC., 176 Penna Ave., Malvern, PA 19355
- TIME PRODUCTS CO. (see PROF. TAPE CO.)
- TRIUS PROD., Box 25, Cleves, O. 45002 (claybird, can thrower)
- WINCHESTER-WESTERN, New Haven, CT 06504 (claybird traps)
- WISLER WESTERN TARGET CO., 1685 Industrial Way, Sparks, NV 89431 (NRA targets)

Trap and Skeet Shooters Equipment

- CREED ENTERPRISES, P.O. Box 3029, Arcadia, CA 91006 (ammo pouch)

- FILMAT ENT., INC., 200 Market St., East Paterson, NJ 07407 (shotshell pouches)
THE I AND I CO., 709 12th St., Altoona, PA 16601 (multiple shell catcher)
OLD MILL TRAP & SKEET, 300 Mill Ridge Rd., Secaucus, NJ 07094 (Seymour shotshell catcher)
OUTERS LABORATORIES, INC., P.O. Box 37, Onalaska, WI 54650 (trap, claybird)
REMINGTON ARMS CO., Bridgeport, CT 06602 (trap, claybird)
SAFE-T-SHELL, INC., 4361 Woodhall Rd., Columbus, OH 43221 (shotgun)
TRIUS PRODUCTS, Box 25, Cleves, OH 45002 (can thrower; trap, claybird)
DANIEL TITUS, 119 Morlyn Ave., Bryn Mawr, PA 19010 (hull bag)
WINCHESTER-WESTERN, New Haven, CT 06504 (trap, claybird)

American and Foreign Arms Associations

United States

Alabama

- ALABAMA GUN COLLECTORS ASSN., Thomas M. Stewart, 601 Eastwood Pl., Birmingham, AL 35216
NORTH ALABAMA GUN COLLECTORS ASSN., P.O. Box 564, Huntsville, AL 35802

Arizona

- ARIZONA GUN COLLECTORS, Miles S. Vaughn, 1129 S. 6th Ave., Tucson, AZ 85701
ARMS COLLECTORS OF THE SOUTHWEST. Robert Kuban, Box 543, Yuma, AZ 85364

INTERNATIONAL CARTRIDGE COLLECTORS ASSN., INC.,
A. D. Amesbury, 4065 Montecito Ave., Tucson, AZ
85711

NATIONAL RELOADING MFRS. ASSN., INC., Box 1697,
Prescott, AZ 86301

Arkansas

ARKANSAS GUN AND CARTRIDGE COLLECTORS CLUB,
M. Cutrell, 2006 E. 7th Pine Bluff, AR 71601

FT. SMITH DEALERS AND COLLECTORS ASSN., Tony
Smith, 1407 57 Terrace, Ft. Smith, AR 72901

California

CALIFORNIA HUNTERS AND GUN OWNERS ASSOC., V. H.
Wacker, 2309 Cipriani Blvd., Belmont, CA 94002

GREATER CALIFORNIA ARMS AND COLLECTORS ASSN.,
Donald L. Bullock, 8291 Carburton St., Long Beach,
CA 90808

LOS ANGELES GUN AND CARTRIDGE COLLECTORS
ASSN., F. H. Ruffra, 20810 Amie Ave., Torrance,
CA 90503

NORTHERN CALIFORNIA HISTORICAL ARMS COLLEC-
TORS ASSN., Julia Lundwall, 25 Mizpah St., San
Francisco, CA 94131

SAN BERNARDINO VALLEY ARMS COLLECTORS, INC.,
F. Schaperkotter, 2697 Acacia Ave., San Bernardino,
CA 92405

SANTA BARBARA ANTIQUE ARMS COLLECTORS ASSN.,
INC., Tom McKissack, P.O. Box 6291, Santa Barbara,
CA 93111

SOUTHERN CALIFORNIA ARMS COLLECTORS ASSN.,
Frank E. Barnyak, 4204 Elmer Ave., N. Hollywood,
CA 91602

U.S. INTERNATIONAL TRAP AND SKEET ASSN., Box 1437,
Huntington Beach, CA 92647

Colorado

ARAPAHOE GUN COLLECTORS. Bill Rutherford, 2968 S. Broadway, Englewood, CO 80110

COLORADO GUN COLLECTORS ASSN., Arnie Dowd, 5970 Estes Ct., Arvada, CO 80002

PIKES PEAK GUN COLLECTORS GUILD. Charles Cell, 406 E. Uintah St., Colorado Springs, CO 80903

Connecticut

ANTIQUE ARMS COLLECTORS ASSN. OF CONN., A. Darling, 35 Stanley St., New Haven, CT 06511

NATIONAL SHOOTING SPORTS FDTN., INC. Warren Page, Pres., 1075 Post Rd., Riverside, CT 06878

STRATFORD GUN COLLECTORS ASSN., INC., P.O. Box 52, Stratford, CT 06497

YE CONN. GUN GUILD, INC., Rob. L. Harris, P.O. Box 67, Cornwall Bridge, CT 06754

Delaware

DELAWARE ANTIQUE ARMS COLLECTORS, C. Landis, 2408 Duncan Rd., Wilmington, DE 19808

District of Columbia

AMERICAN MILITARY INST., Box 568, Washington, DC 20044

AMERICAN ORDNANCE ASSN., 819 Union Trust Bldg., Washington, DC 20005

NATIONAL RIFLE ASSN., 1600 Rhode Island Ave., Washington, DC 20036

Florida

AMERICAN POLICE PISTOL AND RIFLE ASSN., 1100 N.E. 125th St., No. Miami, FL 33161 (law enforcement members only)

FLORIDA GUN COLLECTORS ASSN., Box Marvin, P.O.
Box 470, Jasper, FL 32052

NATIONAL POLICE OFFICERS ASSN. OF AMERICA, Natl.
Police Hall of Fame Bldg., Venice, FL 33595

TAMPA BAY GUN COLLECTORS ASSN., Col. Emmet M.
Jeffreys, 401 49th St., N. St. Petersburg, FL 33710

Georgia

GEORGIA ARMS COLLECTORS, James F. Watterson,
2915 Paces Lake Ct., N.W., Atlanta, GA 30339

Illinois

CENTRAL ILLINOIS GUN COLLECTORS ASSN., INC.

Donald E. Bryan, R.R. #2, Jacksonville, IL 62650

FORT DEARBORN FRONTIERSMEN, Al Normath, 8845
Pleasant Ave., Hickory Hills, IL 60457

FOX VALLEY ARMS FELLOWSHIP, INC., Graham Burn-
side, 203 Oregon Ave., Dundee, IL 60118

ILLINOIS STATE RIFLE ASSN., 2800 N. Milwaukee Ave.,
Chicago, IL 60618

ILLINOIS GUN COLLECTORS ASSN., P. E. Pitts, P.O.
Box 1524, Chicago, IL 60690

LITTLE FORT GUN COLLECTORS ASSN., Ernie Robin-
son, P.O. Box 194, Gurney, IL 60031

MISSISSIPPI VALLEY GUN AND CARTRIDGE COLLEC-
TORS ASSN., Mel Sims, Box 426, New Windsor, IL
61465

SAUK TRAIL GUN COLLECTORS, L. D. Carlock, Rte. 1,
Box 169, Prophetstown, IL 61277

WABASH VALLEY GUN COLLECTORS ASSN., INC. Mrs.
Betty Baer, 1002 Lincoln Pk. Ave., Danville, IL
61832

Indiana

AMERICAN SINGLE SHOT RIFLE ASSN., G. H. Crontz,
11439 Wicker Ave., Cedar Lake, IN 46303

CENTRAL INDIANA GUN COLLECTORS ASSN., Paul E. Daughterty, 421 E. Washington St., Hartford City, IN 47348

CRAWFORDSVILLE GUN CLUB, INC., Rob. J. K. Edmonds, R.R. 2, Crawfordsville, IN 47933

MIDWEST GUN TRADERS, INC., Glen Wittenberger, 4609 Oliver St., Ft. Wayne, IN 46806

NATIONAL MUZZLE LOADING RIFLE ASSN., Box 67, Friendship, IN 47021

NORTHERN INDIANA GUN COLLECTORS ASSN., Joe Katona, 16150 Ireland Rd., Mishawaka, IN 46544

SOUTHERN INDIANA GUN COLLECTORS ASSN., INC., Harold M. McClary, 509 N. 3rd St., Boonville, IN 47601

TIPPECANOE GUN AND CARTRIDGE COLLECTORS CLUB, Leonard Ledman, R.R. 12, Box 212, Lafayette, IN

Iowa

CEDAR VALLEY GUN, COLLECTORS, R. L. Harris, 1602 Wenig Rd., N.E., Cedar Rapids, IA 52402

CENTRAL STATES GUN COLLECTORS ASSN., Chas. J. Versluis, 701 Broadway, Waterloo, IA 50703

EASTERN IOWA GUN AND CARTRIDGE COLLECTORS ASSN., F. Fitzpatrick, 305 N. Eliza St., Maquoketa, IA 52060

QUAD CITY ARMS COLLECTORS ASSN., A. Squire, 1845 W. 3rd St., Davenport, IA 52802

Kansas

CHISHOLM TRAIL ANTIQUE GUN COLLECTORS ASSN., P.O. Box 13093, Wichita, KS 67213

FOUR STATE COLLECTORS ASSN., M. G. Wilkinson, 915 E. 10th Pittsburg, KS 66762

KANSAS CARTRIDGE COLLECTORS ASSN., Bob Linder, Box 84, Plainville, KS 67663

MISSOURI VALLEY ARMS COLLECTORS ASSN., Chas. P. Samuel, Jr., Box 8204, Shawnee Mission, KS 66208
SOLOMON VALLEY GUN COLLECTORS, Frank Wheeler, Box 230, Osborne, KS 76473

Kentucky

JOHN HUNT MORGAN GUN COLLECTORS INC., P.O. Box 525, Paris, KY 40361
KENTUCKIANA ARMS COLLECTORS ASSN., Charles R. Phelps, Box 1776, Louisville, KY 40201
KENTUCKY GUN COLLECTORS ASSN., INC., J. A. Smith, Box 64, Owensboro, KY 42301

Louisiana

ARK-LA-TEX GUN COLLECTORS ASSN., Ray Franks, 1521 Earl St., Shreveport, LA 71108
BAYOU GUN CLUB, John West, 825 Ida., New Orleans, LA
PELICAN ARMS COLLECTORS, B. Thompson, 9142 Cefalu Dr., Baton Rouge, LA 70811

Maryland

CUMBERLAND VALLEY ARMS COLLECTORS ASSN., Mrs. S. Naylor, Rte. #2, Hagerstown, MD 21740
MARYLAND ARMS COLLECTORS ASSN., INC. H. R. Moale, 2602 Hillcrest Ave., Baltimore, MD 21234
PENN-MAR-VA ANTIQUE ARMS SOCIETY, T. Wibberlev, 54 E. Lincoln Ave., Hagerstown, MD 21740
POTOMAC ARMS COLLECTORS ASSN., Bill Summerfelt, P.O. Box 93, Riverdale, MD 20840

Massachusetts

BAY COLONY WEAPONS COLLECTORS INC., Ronald B. Santurjian, 47 Homer Rd., Belmont, MA 02178
MASSACHUSETTS ARMS COLLECTORS, John J. Callan, Jr., 15 Montague St., Worcester, MA 01603

U.S. REVOLVER ASSN., Stanley A. Sprague, 59 Alvin St., Springfield, MA 01104

Michigan

MICHIGAN ANTIQUE ARMS COLLECTORS, INC., W. H. Heid, 8914 Borgman Ave., Huntington Woods, MI 48070

MICHIGAN RIFLE AND PISTOL ASSN., John W. Novitch, 124 Moss Ave., Highland Park, MI 48203

ROYAL OAK GUN COLLECTORS, Margaret Parget, 13143 Borgmann, Huntington Woods, MI 48070

Minnesota

MINNESOTA WEAPONS COLLECTORS ASSN., INC., W. Nemitz, 1069 S. Crestview Dr., St. Paul, MN 55119

TWIN PORTS WEAPONS COLLECTORS, Jack Puglisi, 6504 Lexington St., Duluth, MN 55807

Mississippi

DIXIE ARMS COLLECTORS, Ruth Creecy, 1509 W. 7th, Hattiesburg, MS 39401

MISSISSIPPI GUN COLLECTORS ASSN., Mrs. J. E. Swinney, Box 1332, Hattiesburg, MS 39401

Missouri

EDWARDSVILLE, ILL. GUN COLLECTORS, A. W. Stephensmeier, 317 N. Grand Bl., St. Louis, MO 63103

MERAMEC VALLEY GUN COLLECTORS, L. W. Olson, Star Route, St. Clair, MO

MINERAL BELT GUN COLLECTORS ASSN., G. W. Gunter, 1110 E. Cleveland Ave., Monett, MO 65708

Montana

MONTANA ARMS COLLECTORS ASSN., Chris Corensen, 175 6th Ave., N.W., Kalispell, MT 59901

NORTH AMERICAN SPORTSMEN'S ASSN., Box 1943-2501
4th Ave., N. Billings, MT 59103

Nebraska

NEBRASKA GUN AND CARTRIDGE COLLECTORS, E. M.
Zalud, 710 West 6th St., North Platte, NE 69101
PINE RIDGE GUN COLLECTORS, Loren Pickering, 509
Elm St., Crawford, NE 69339

New Hampshire

MAPLE TREE GUN COLLECTORS ASSN., E. P. Hector,
Meriden Rd., Lebanon, NH 03766
NEW HAMPSHIRE ARMS COLLECTORS INC., James Til-
linghast, Box 5, Marlow, NH 03456

New Jersey

EXPERIMENTAL BALLISTICS ASSOCIATES, Ed Yard,
110 Kensington, Trenton, NJ 08618
JERSEY SHORE ANTIQUE ARMS COLLECTORS, Bob Hol-
loway, 1755 McGallard Ave., Trenton, NJ 08610
NEW JERSEY ARMS COLLECTORS CLUB, INC., Joseph
Rixon, 122 Bender Ave., Roselle Park, NJ 07204

New Mexico

NEW MEXICO GUN COLLECTORS ASSN., P.O. Box 14145,
Albuquerque, NM 87111
SANTE FE GUN COLLECTORS ASSN., Ernie Lang, 108 $\frac{1}{2}$
Nugget, Los Alamos, NM 87544

New York

ARMOR AND ARMS CLUB, J. K. Watson, 51 W. 51st St.,
New York, NY 10019
FORT LEE ARMS COLLECTORS, W. E. Sammis, R.D.
776 Brookridge Dr., Valley Cottage, NY 10898
HUDSON-MOHAWK ARMS COLLECTORS ASSN., INC.,

Bennie S. Pisarz, 108 W. Main St., Frankfort, NY 13340

INTERNATIONAL BENCHREST SHOOTERS, Emory L. Tooley, 8 Cline St., Dolgeville, NY 13329

IROQUOIS ARMS COLLECTORS ASSN., Dennis Freeman, 12144 McNeely Rd., Akron, NY 14001

LONG ISLAND ANTIQUE GUN COLLECTORS ASSN., Frank Davison, 8 Johnson Pl., Baldwin, NY 11510

MID-STATE ARMS COLLECTORS AND SHOOTERS CLUB, Bennie S. Pisarz, 108 W. Main St., Frankfort, NY 13340

NEW YORK STATE ARMS COLLECTORS ASSN., INC., Marvin Salls, R.D. 1, Ilion, NY 13357

SPORTING ARMS AND AMMUNITION MANUFACTURERS' INST., 420 Lexington Ave., New York, NY 10017

WESTCHESTER ARMS COLLECTORS CLUBS, INC., F. E. Falkenbury, Secy., 75 Hillcrest Rd., Hartsdale, NY 10530

North Carolina

CAROLINE GUN COLLECTORS ASSN., N.C., Bill Harvey, P.O. Box 464, Wilson, NC 27893

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AMATEUR TRAP SHOOTING ASSN., P.O. Box 246, Vandalia, OH 45377

AMERICAN SOCIETY OF ARMS COLLECTORS, INC., Rob. F. Rubendunst, 6550 Baywood Ln., Cincinnati, OH 45224

BARBERTON GUN COLLECTORS ASSN., R. N. Watters, 1108 Bevan St., Barberton, OH 44203

MAUMEE VALLEY GUN COLLECTORS ASSN., J. Jennings, 3450 Gallatin Rd., Toledo, OH 43606

NATIONAL BENCH REST SHOOTERS ASSN., INC., Bernice McMullen, 607 W. Line St., Minerva, OH 44657

OHIO GUN COLLECTORS ASSN., INC., Mrs. C. D. Rickey,
130 S. Main St., Prospect, OH 43342

THE STARK GUN COLLECTORS, INC., Russ E. McNary,
147 Miles Ave., N.W. Canton, OH 44708

TRI-STAGE GUN COLLECTORS, Doyt S. Gamble, 1115
N. Main St., Lima, OH 45801

Oklahoma

INDIAN TERRITORY GUN COLLECTORS ASSN., P.O. Box
4491, Tulsa, OK 74104

Oregon

JEFFERSON STATE ARMS COLLECTORS, Art Chipman,
2251 Ross Lane, Medford, OR 97501

OREGON ARMS COLLECTORS ASSN., INC., Dick Hamilton,
P.O. Box 152, Junction City, OR 97448

WILLIAMETTE VALLEY ARMS COLLECTORS ASSN., M.
Brooks, 2110 W. 20th., Eugene, OR 97405

Pennsylvania

BOONE AND CROCKETT CLUB, C/O CARNEGIA MUSEUM,
4400 Forbes Ave., Pittsburgh, PA 15213

CENTRAL PENN ANTIQUE ARMS ASSN., Geo. Smith-
gall, 549 W. Lemon St., Lancaster, PA 17603

FORKS OF THE DELAWARE WEAPONS ASSN., INC., John
F. Scheid, 348 Bushkill St., Easton, PA 18042

LANCASTER MUZZLE LOADING RIFLE ASSN., James H.
Frederick, Jr., R.D. 1 Box 447, Columbia, PA 17512

NORTHERN TIER ANTIQUE GUN COLLECTORS, Cliff
Briedinger, Trout Run, PA 17771

PENNSYLVANIA ANTIQUE GUN COLLECTORS ASSN.,
Zenas H. Hoover, 222 Philadelphia St., Indiana, PA
15701

PENNSYLVANIA GUN COLLECTORS ASSN., Arch Waugh,
R.D. 2, Washington, PA 15301

PRESQUE ISLE GUN COLLECTORS ASSN., James Welch,
156 E. 37th St., Erie, PA 16506

SOMERSET RIFLE AND PISTOL CLUB, J. Richard Ross,
2 Stein Bldg., Somerset, PA 15501

TWO LICK VALLEY GUN COLLECTORS, Zenas Hoover,
222 Phila. St., Indiana, PA 15701

South Carolina

BELTON GUN CLUB, INC., J. K. Phillips, P.O. Box 605,
Belton, SC 29627

NATL. ARMS COLLECTORS ASSN., INC., Jim McNelley,
Box 1462, Columbia, SC 29201

SOUTH CAROLINA ARMS COLLECTORS ASSN., J. W.
McNelley, 3215 Lincoln, Columbia, SC 29201

South Dakota

DAKOTA TERRITORY GUN COLLECTORS ASSN., INC.,
H. A. Jons, 1711 W. 12th St., Sioux Falls, SD 57104

Tennessee

MEMPHIS ANTIQUE WEAPONS ASSN., F. Dauser, 3429
Jenkins, Memphis, TN 38118

MEMPHIS GUN COLLECTORS ASSN., R. L. Haley, 3888
S. Lakewood Dr., Memphis, TN 38128

SMOKY MOUNTAIN GUN COLLECTORS ASSN., P.O. Box
22, Oak Ridge, TN 37830

TENNESSEE GUN COLLECTORS ASSN., INC., M. H. Parks,
3556 Pleasant Valley Rd., Hansville, TN 37204

Texas

ALAMO ARMS COLLECTORS, Bill Brookshire, 410
Rector, San Antonio, TX 78216

HOUSTON GUN COLLECTORS ASSN., C. McKim, 5454
Stillbrooke, Houston, TX 77035

NATIONAL SKEET SHOOTING ASSN., James M. Leer, Jr.,

212 Linwood Bldg., 2608 Inwood Rd., Dallas, TX
75235

NATIONAL SPORTSMAN'S CLUB, P.O. Box 2003, Dallas,
TX 75221

PASO DEL NORTE GUN COLLECTORS INC., Ken Hockett,
1216 Mescalero, El Paso, TX 79925

PERMIAN BASIN RIFLE AND PISTOL CLUB, INC., E. L.
Good, Box 459, Midland, TX 79701

PIONEER GUN COLLECTORS ASSN., J. O. Wingate, 4611
Cherokee, Amarillo, TX 79109

SABINE GUN COLLECTORS CLUB, Mrs. Irene Vivier,
1042 Iowa, Beaumont, TX 77705

TEXAS GUN COLLECTORS ASSN., Mrs. Taska Clerk,
3119 Produce Row, Houston, TX 77023

WACO GUN COLLECTORS, C. V. Pruitt, 4021 N. 26th,
Waco, TX 76708

Utah

UTAH GUN COLLECTORS ASSN., S. Gerald Keogh, 875
20th St., Ogden, UT 84401

Virginia

NORTH-SOUTH SKIRMISH ASSN., John L. Rawls, P.O.
Box 114, McLean, VA 22101

SHENANDOAH VALLEY GUN COLLECTORS ASSN., Daniel
E. Blye, P.O. Box 926, Winchester, VA 22601

VIRGINIA ARMS COLLECTORS AND ASSN., W. H. Bacon,
4601 Sylvan Rd., Richmond, VA 23225

Washington

WASHINGTON ARMS COLLECTORS, INC., Don Zwicker,
446 Pelly Ave., Renton, WA 98055

Wisconsin

CHIPPEWA VALLEY WEAPONS COLLECTORS, J. M. Sul-
livan, 504 Ferry St., Eau Claire, WI 54701

GREAT LAKES WEAPONS COLLECTORS ASSN., INC., E.
Warnke, 2249A N. 61 St., Wauwatosa, WI 53213
WISCONSIN GUN COLLECTORS ASSN., INC., Rob. Zell-
mer, W180N8996 Leona Lane, Menomonee Falls,
WI 53051

Wyoming

WYOMING GUN COLLECTORS, Bob Funk, 224 N. 2W.,
Riverton, WY 82501

Australia

NAT'L SPORTING SHOOTERS ASSN. OF AUSTRALIA,
G. O. Nelis, P.O. Box 90, Stafford, Brisbane, Qld.,
AUSTR 4053

Canada

Alberta

CANADIAN HISTORICAL ARMS SOCIETY, P.O. Box 901,
Edmonton, ALB. CAN T5J 2L8

Ontario

NIAGARA ARMS COLLECTORS, Box 948, Beamsville,
ONT CAN

ONTARIO ARMS COLLECTORS ASSN., P. Peddle, 174
Ellerslie Ave., Willowdale, ONT CAN

OSHAWA ANTIQUE GUN COLLECTORS, INC., Gordon J.
Dignem, 613 Rosmere St., Oshawa, ONT CAN

Quebec

LOWER CANADA ARMS COLLECTORS ASSN., Secretary,
P.O. Box 1162, St. B., Montreal 101, QU CAN

Europe

England

ARMS AND ARMOUR SOCIETY OF LONDON, F. Wilkin-
son, 40 Great James St., Holborn, London W.C.1.

MUZZLE LOADERS' ASSN. OF GREAT BRITAIN, M. A.
Malet, 43 Sandpit Ln., St. Albans, Hertfs, ENG
NATIONAL RIFLE ASSN. (BRITISH), Bisley Camp, Brook-
wood, Working, Surrey, ENG

France

LES ARQUEBUSIERS DE FRANCE, Mme. Marckmann,
70 Rue des Chantiers, 78-Versailles, FR

New Zealand

NEW ZEALAND DEERSTALKERS ASSN., J. M. Murphy,
P.O. Box 263, Wellington, NZ

South Africa

HISTORICAL FIREARMS SOCIETY OF SOUTH AFRICA,
"Minden" 11 Buchan Rd., Newlands, Cape Town,
SA

Fish and/or Game Departments

United States

Alabama

DEPARTMENT OF CONSERVATION
DIVISION OF GAME AND FISH
64 N. Union St.
Montgomery 36104

Alaska

DEPARTMENT OF FISH AND GAME
Subport Bldg.
Juneau 99801

Arizona

GAME AND FISH DEPARTMENT
2222 W. Greenway
Phoenix 85007

Arkansas

GAME AND FISH COMMISSION
State Capitol Grounds
Little Rock 72201

California

DEPARTMENT OF FISH AND GAME
1416 9th St.
Sacramento 95814

Colorado

GAME, FISH AND PARKS DIVISION
6060 Broadway
Denver 80216

Connecticut

BOARD OF FISHERIES AND GAME
State Office Bldg.
Hartford 06115

Delaware

DIVISION OF FISH AND WILDLIFE
"D" Street
Dover 19901

Florida

DIVISION OF GAME AND FRESH WATER FISH
620 So. Meridian
Tallahassee 32304

Georgia

STATE GAME AND FISH COMMISSION
Trinity-Washington Bldg.
270 Washington St., S.W.
Atlanta 30334

Hawaii

DIVISION OF FISH AND GAME

530 So. Hotel St.

Honolulu 96813

Idaho

FISH AND GAME DEPARTMENT

Box 25

Boise 83707

Illinois

DEPARTMENT OF CONSERVATION

102 State Office Bldg.

400 So. Spring St.

Springfield 62706

Indiana

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF FISH AND GAME

607 State Office Bldg.

Indianapolis 46209

Iowa

STATE CONSERVATION COMMISSION

State Office Bldg.

300 4th St.

Des Moines 50319

Kansas

FORESTRY, FISH AND GAME COMMISSION

Box 1028

Pratt 67124

Kentucky

DEPARTMENT OF FISH AND WILDLIFE RESOURCES
State Office Bldg. Annex
Frankfort 40601

Louisiana

WILD LIFE AND FISHERIES COMMISSION
400 Royal St.
New Orleans 70130

Maine

DEPARTMENT OF INLAND FISHERIES AND GAME
State House
Augusta 04330

Maryland

FISH AND WILDLIFE ADMINISTRATION
State Office Bldg.
Annapolis 21401

Massachusetts

DIVISION OF FISHERIES AND GAME
100 Cambridge St.
Boston 02202

Michigan

DEPARTMENT OF NATURAL RESOURCES
Mason Bldg.
Lansing 48926

Minnesota

DIVISION OF GAME AND FISH
DEPARTMENT OF CONSERVATION
Centennial Bldg.
658 Cedar St.
St. Paul 55101

Mississippi

GAME AND FISH COMMISSION

Game and Fish Bldg.

402 High St.

Box 451

Jackson 39205

Missouri

DEPARTMENT OF CONSERVATION

Box 180

Jefferson City 65101

Montana

FISH AND GAME DEPARTMENT

Helena 59601

Nebraska

NEBRASKALAND

State Capitol Bldg.

Lincoln 68509

Nevada

DEPARTMENT OF FISH AND GAME

Box 10678

Reno 89510

New Hampshire

FISH AND GAME DEPARTMENT

34 Bridge St.

Concord 03301

New Jersey

DIVISION OF FISH, GAME AND SHELL FISHERIES

Box 1809

Trenton 08625

New Mexico

DEPARTMENT OF GAME AND FISH
State Capitol
Santa Fe 87501

New York

DIVISION OF FISH AND WILDLIFE
STATE DEPARTMENT OF ENVIRONMENTAL
CONSERVATION
50 Wolf Rd.
Campus, Albany 12226

North Carolina

WILDLIFE RESOURCES COMMISSION
Box 2919
Raleigh 27602

North Dakota

STATE GAME AND FISH DEPARTMENT
2121 Hovett Ave.
Bismarck 58501

Ohio

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
1500 Dublin Rd.
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DEPARTMENT OF WILDLIFE CONSERVATION
1801 No. Lincoln
Oklahoma City 73105

Oregon

STATE GAME COMMISSION
Box 3503
Portland 97208

Pennsylvania

GAME COMMISSION
P.O. Box 1567
Harrisburg 17120

Rhode Island

DEPARTMENT OF NATURAL RESOURCES
Veteran's Memorial Bldg.
Providence 02903

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WILDLIFE RESOURCES DEPARTMENT
1015 Main St.
Box 167
Columbia 29202

South Dakota

DEPARTMENT OF GAME, FISH AND PARKS
State Office Bldg.
Pierre 57501

Tennessee

GAME AND FISH COMMISSION
Box 40747
Ellington Center
Nashville 37220

Texas

PARKS AND WILDLIFE DEPARTMENT
John H. Reagan Bldg.
Austin 78701

Utah

DIVISION OF FISH AND GAME
1596 W.N. Temple
Salt Lake City 84116

Vermont

FISH AND GAME DEPARTMENT
151 Main St.
Montpelier 05602

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COMMISSION OF GAME AND INLAND FISHERIES
4010 W. Broad St.
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Richmond 23230

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600 No. Capitol Way
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DEPARTMENT OF NATURAL RESOURCES
1800 Washington St.
Charleston 25305

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DEPARTMENT OF NATURAL RESOURCES
Box 450
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Wyoming

GAME AND FISH COMMISSION
Box 1589
Cheyenne 83001

Canada and Territorial Agencies

Alberta

DEPARTMENT OF LANDS AND FORESTS
Natural Resources Bldg.
109 St. and 99th Ave.
Edmonton 6

British Columbia

DEPARTMENT OF RECREATION AND CONSERVATION
FISH AND WILDLIFE BRANCH
Victoria

Manitoba

DEPARTMENT OF MINES AND NATURAL RESOURCES
DIRECTOR OF WILDLIFE & DIRECTOR OF FISHERIES
908-910 Norquay Bldg.
Winnipeg 1

New Brunswick

DEPARTMENT OF NATURAL RESOURCES
Room 516
Centennial Bldg.
Fredericton

Newfoundland

WILDLIFE SERVICE
DEPARTMENT OF MINES,
AGRICULTURE AND RESOURCES
Government of Newfoundland and Labrador
St. John's

Northwest Territories

GOVERNMENT OF THE NORTHWEST TERRITORIES
Yellowknife

Nova Scotia

NOVA SCOTIA FISH AND GAME ASSOCIATION
P.O. Box 654
Halifax

Ontario

FISH AND WILDLIFE BRANCH
DIVISION OF OUTDOOR RECREATION
DEPARTMENT OF LANDS AND FORESTS
Parliament Bldgs.
Toronto

Prince Edward Island

FISH AND WILDLIFE DIVISION
DEPARTMENT OF TOURIST DEVELOPMENT
Charlottetown

Quebec

DEPARTMENT OF TOURISM, FISH AND GAME
930 Chemin St.
St. Foy
Quebec

Saskatchewan

DEPARTMENT OF NATURAL RESOURCES
Administration Bldg.
Regina

Yukon Territory

DIRECTOR OF GAME
YUKON TERRITORIAL GOVERNMENT
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Equivalents, Conversion Tables

"Metric" and "U.S." Constants— Conversion Factors

| | | | |
|---------------------------------------|---|---------|--------------------------|
| Millimeters | X | .03937 | Inches |
| " | X | 25.4 | " |
| Centimeters | X | .3937 | " |
| " | X | 2.54 | " |
| Meters | X | 39.37 | " (Act of Congress) |
| " | X | 3.281 | Feet |
| " | X | 1.094 | Yard |
| Square mm. | X | .0155 | Square Inches |
| " " " | X | 645.1 | " " |
| Square cm. | X | .155 | " " |
| " " " | X | 6.451 | " " |
| Cubic cm. | X | 16.383 | Cubic inches |
| " " " | X | 3.69 | Fluid drachms |
| " " " | X | 29.57 | Fluid ounces |
| Grams | X | 15.4324 | Grains (Act of Congress) |
| " (water) | X | 29.57 | Fluid ounces |
| Grams | X | 28.35 | Ounces avoirdupois |
| Kilograms | X | 2.2046 | Pounds |
| " | X | 35.3 | Ounces avoirdupois |
| Kilograms per sq. cm. (atmosphere) | X | 14.223 | Pounds per sq. in. |
| Kilogram-meters | X | 7.233 | Foot-pounds |

Measures of Weight

Avoirdupois or Commercial Weight

1 gross or long ton equals 2240 pounds.

1 net or short ton equals 2000 pounds.

1 pound equals 16 ounces equals 7000 grains.

1 ounce equals 16 drachms equals 437.5 grains.

The following measures for weight are now seldom used in the United States:
 1 hundredweight equals 4 quarters equals 112 pounds (1 gross or long ton equals 20 hundredweights); 1 quarter equals 28 pounds; 1 stone equals 14 pounds; 1 quintal equals 100 pounds.

Troy Weight, Used for Weighing Gold and Silver

1 pound equals 12 ounces equals 5760 grains.
 1 ounce equals 20 pennyweights equals 480 grains.
 1 pennyweight equals 24 grains.
 1 carat (used in weighing diamonds) equals 3.168 grains.
 1 grain Troy equals 1 grain avoirdupois equals 1 grain apothecaries' weight.

Apothecaries' Weight

1 pound equals 12 ounces equals 5760 grains.
 1 ounce equals 8 drachms equals 480 grains.
 1 drachm equals 3 scruples equals 60 grains.
 1 scruple equals 20 grains.

Decimal Equivalents of Fractions of an Inch

| | | | | | |
|-----------------|----------|-----------------|----------|-----------------|----------|
| $\frac{1}{64}$ | 0.015625 | $\frac{17}{64}$ | 0.265625 | $\frac{33}{64}$ | 0.515625 |
| $\frac{1}{32}$ | 0.03125 | $\frac{9}{32}$ | 0.28125 | $\frac{17}{32}$ | 0.53125 |
| $\frac{3}{64}$ | 0.046875 | $\frac{19}{64}$ | 0.296875 | $\frac{35}{64}$ | 0.546875 |
| $\frac{1}{16}$ | 0.0625 | $\frac{5}{16}$ | 0.3125 | $\frac{9}{16}$ | 0.5625 |
| $\frac{5}{64}$ | 0.078125 | $\frac{21}{64}$ | 0.328125 | $\frac{37}{64}$ | 0.578125 |
| $\frac{3}{32}$ | 0.09375 | $\frac{11}{32}$ | 0.34375 | $\frac{19}{32}$ | 0.59375 |
| $\frac{7}{64}$ | 0.109375 | $\frac{32}{64}$ | 0.359375 | $\frac{39}{64}$ | 0.609375 |
| $\frac{1}{8}$ | 0.125 | $\frac{3}{8}$ | 0.375 | $\frac{5}{8}$ | 0.625 |
| $\frac{9}{64}$ | 0.140625 | $\frac{25}{64}$ | 0.390625 | $\frac{41}{64}$ | 0.640625 |
| $\frac{5}{32}$ | 0.15625 | $\frac{13}{32}$ | 0.40625 | $\frac{21}{32}$ | 0.65625 |
| $\frac{11}{64}$ | 0.171875 | $\frac{27}{64}$ | 0.421875 | $\frac{42}{64}$ | 0.671875 |
| $\frac{3}{16}$ | 0.1875 | $\frac{7}{16}$ | 0.4375 | $\frac{11}{16}$ | 0.6875 |
| $\frac{13}{64}$ | 0.203125 | $\frac{29}{64}$ | 0.453125 | $\frac{45}{64}$ | 0.703125 |
| $\frac{7}{32}$ | 0.21875 | $\frac{15}{32}$ | 0.46875 | $\frac{23}{32}$ | 0.71875 |
| $\frac{15}{64}$ | 0.234375 | $\frac{31}{64}$ | 0.484375 | $\frac{47}{64}$ | 0.734375 |
| $\frac{1}{4}$ | 0.250 | $\frac{1}{2}$ | 0.500 | $\frac{3}{4}$ | 0.750 |
| $\frac{49}{64}$ | 0.765625 | $\frac{27}{32}$ | 0.84375 | $\frac{59}{64}$ | 0.921875 |
| $\frac{25}{32}$ | 0.78125 | $\frac{55}{64}$ | 0.859375 | $\frac{15}{16}$ | 0.9375 |
| $\frac{51}{64}$ | 0.796875 | $\frac{7}{8}$ | 0.875 | $\frac{61}{64}$ | 0.953125 |
| $\frac{13}{16}$ | 0.8125 | $\frac{57}{64}$ | 0.890625 | $\frac{31}{32}$ | 0.96875 |
| $\frac{53}{64}$ | 0.828125 | $\frac{29}{32}$ | 0.90625 | $\frac{63}{64}$ | 0.984375 |

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